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NEWSPAPER

NEWS IN BRIEF

Potter Cuts Prices Of Purchased Units

MELVILLE, N.Y. – Potter Instrument Co. is encouraging users to buy its compatible peripherals by cutting the prices of purchased equipment from 30% to more than 60%. The cuts were made possible by improvements in design and manufacturing, the company said, and include:

- 1403-compatible printer and controller, cut from $48,375 to $27,600.
- 3330-replacement disk drive, from $27,000 to $13,000/spindle.
- 2314-compatible disk drive; from $20,000 to $10,700 for voice-coil-equipped units.
- 2311-equivalent disk drive, from $15,385 to $4,994.

UCLA Campus Net Battles Draining Federal, IBM Funds

LOS ANGELES – Colleges can't sit back and watch federal funds evaporate without reacting with cost-saving measures, according to William Kehl, director of the Campus Computing Network at UCLA.

Commenting on the upcoming terminations of a $950,000 grant from IBM and a $1-million, three-year grant from the National Science Foundation, Kehl said UCLA network officials had built income and reduced expenses, and will not lose money this year or next year.

The UCLA system operates as a "cost recovery center," he continued. Joining the Arpa (Advanced Research Projects Agency) network and reducing staff by 30% in the past year, mostly by attrition, will enable the network to break even or make a small profit, he indicated.

On the Inside This Week

N.Y. State DP Center Seeks 'Full Service Concept' — *Page 6*

Special Report: CRT Versatile As Output Device — *Page 8*

W. Va. Counties Share Tax Processing Facilities — *Page 13*

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370 Circuits Heat Up User Problems

By Francis J. O'Reilly
Special to Computerworld

Its more densely packed circuitry makes IBM's System 370 a hot system, and the cost of carrying off this heat is giving some companies second thoughts about leaving the System 360.

Unit for unit, the 370 generates more heat than the 360. For example, a 256K Model 50 generates 22,000 BTUs of heat during each hour of operation. Its replacement, the 256K Model 145 generates 54,600. The 1,100 line/min 1403 printer generates 4,500 BTUs of heat; the 3211 printer – operating at twice the speed – generates 13,800 BTUs.

When a center upgrades its CPU, the increase in heat output is even more marked in the transition. One company, planning to replace its 256K 360/40 with a 384K 370/145, found the heat generated by the processor jumped from 11,000 to 83,000 BTUs.

CW Survey

For an entire system – designed to replace an existing 360 with no concern given to upgrading – the amount of heat which the air-conditioning system must carry off just about doubles.

The company that planned to go to a 370/145 had designed its center to hold dual 512K 360/50 systems. The center had 420,000 BTUs of air-conditioning for these systems alone, drawing from both the central system and free-standing units. The projected 370 configuration, dual 384K 145s, is expected to generate 600,000 BTUs and

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Justice Gives Top Priority To IBM Suit

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. – After almost three-and-one-half years the Justice Department has given "top priority" to its antitrust suit against IBM.

And it appears likely that the case will end up in court instead of in a consent decree as was the case with the two previous government antitrust actions against IBM.

"We regard this case as the most important now pending. It's moving and on the track," according to Bruce B. Wilson, deputy assistant attorney general and the number two man in Justice's antitrust division.

The suit against IBM was brought by the Johnson Administration in January 1969 – the last major antitrust move it made before leaving office and before the Nixon inauguration.

IBM Documentation

One of the major causes for delay in the case is the tremendous amount of documentation IBM has given the government concerning its activities in the general-purpose computer field.

To date, IBM has given the Justice department over 25 million documents, according to a "conservative" estimate by the department. All of the documentation has to be read, classified and filed, Justice sources added.

Many firms use excessive documentation to delay action in antitrust matters and to drive up the cost of prosecuting antitrust cases, one antitrust lawyer said.

The expense and delay often cause the government to accept a consent decree instead of following through with its case, he added.

Several Washington sources, however, indicated recently that the IBM case may be taken to court instead of being settled by a consent action.

"After all of the fuss over the International Telephone and Telegraph antitrust settlement, it is likely that the Justice Department will press its antitrust actions

(Continued on Page 2)

Terminal Trading

Broker Joseph A. Lanell and booth clerk Joseph Henry check round-lot limit order on CRT terminal in the Amex Computerized Order Display and Execution System pilot test on the American Stock Exchange trading floor. System displays limit orders (orders to be executed at a specified price, or better) on terminal in booth. Current highest bid to buy and lowest offer to sell the stock, along with other market data, are displayed alongside the order.

Information Standards

GAO Funds Lift NAS Study

By Don Leavitt
Of the CW Staff

BEDFORD, Mass. "Seed money" from the General Accounting Office (GAO) will allow the National Academy of Science (NAS) to start a "long overdue" study which may lead to new information science standards for the federal government, according to Edward J. Mahoney, deputy director of GAO's Financial and General Management Studies Division.

The cross-agency funding is a departure from GAO's normal role of acknowledged watchdog of federal DP projects, but the change was justified to get the project going, Mahoney told the Computer Performance Evaluation Users Group, a government-wide organization that met at the Air Force's L.G. Hanscom Field here last week.

The study will be conducted by NAS's Computer Science and Engineering Board and will take years and "millions of dollars."

The funding is an extremely long-term contract under which the academy hopes to help GAO define how the government's DP procurement should be handled, according to Prof. Anthony Oettinger, chairman of the NAS Computer Science and Engineering Board.

The project is almost deliberately ill-defined, to allow freedom to look at the problem from all aspects, he said, adding that both hardware and software would be considered.

GAO is also "very sympathetic" with the aims of the new "Brooks Bill," HR 13200, which, if it becomes law, will provide the National Bureau of Standards with $100 million/yr for research in the computer field, he noted.

The bill would also give NAS $3.5 million and part of that could "certainly" go into the study started with the GAO funds, he noted.

The legislation is still being considered by a House subcommittee, but hearings

(Continued on Page 2)

370 Heat Problems Can Raise Cooling, Floor Building Costs

(Continued from Page 1)

major rework of the cooling system seems inevitable.

Surprisingly, few people, even among those charged with the responsibility for equipment planning, know the 370 generates so much heat. Discussions with some of these men hrought out four reasons for the ignorance:

- One third of the companies questioned was building new centers for the 370, and had never compared environmental characteristics with those of the 360.
- One fifth was installing Model 165s. These units use chilled water to carry off 129,000 BTUs of heat, and emit only 34,000 into the room. Thus, the load the 165 puts on the room air system is less than that of the 135. Moreover, the installation of plumbing for the CPU seems to mask all other environmental problems.
- All of the installations had been made since last summer, so any marginal problems which might exist have not yet proved troublesome.
- One fifth of the companies was installing the computer in a room designed for 1400/7000 Series equipment, and had excess cooling capacity due to the decrease in the number of units comprising the systems.

No installation can afford to ignore the environmental characteristics of System 370. But the centers which should check them most closely are those designed specifically for System 360, those with rapidly growing data processing workloads and those in older buildings. A center with these three characteristics may face a sizable bill for the reconstruction of its cooling apparatus.

And more than the cooling system may have to be rebuilt. For example, the floor of the building may have to be reinforced since the 370 puts 180 lbs on the same square foot where the 360 puts 90 lbs; and some computer floors are designed to hold only 125 lb/sq ft.

Reconstruction Costs

The cost of this reconstruction can be expensive. In New York, engineers estimate it costs $2,000/ton (12,000 BTUs) to add air-conditioning to existing space, not counting the cost of building alterations.

Those who want to guage their own air-conditioning requirements should allow 40 BTU/sq ft for people, lights and loss through the walls. The requirements for the various items of equipment are given in the *IBM System 370 Installation Manual, Physical Planning.*

With this rule and manual, a medium-sized 145 system housed in a 40-ft by 40-ft room would require 165,000 BTUs of cooling for the hardware and 64,000 for the space. Engineers allow 25% for error.

Some installations find the cost of rebuilding to house the 370 is high enough to consider alternatives. Leasing a one-step-up 360 system from a third party can provide the required throughput, and at a cost below that now paid IBM for monthly rental.

The drawbacks are loss of flexibility and the inevitable lack of software support as IBM withdraws support from the 360 line.

Therefore, leasing 360s may be practical only for those companies able to support their own software staff. Other companies may find it cheaper in the long run to pay the price and install the 370.

Uni-Coll DP Center to Service 7 Colleges

PHILADELPHIA – The University City Science Center has established a non-profit subsidiary to provide computing services to at least seven educational institutions. The center is also in the process of taking over the University of Pennsylvania's multimillion dollar computer center.

The new organization, known as Uni-Coll Corp, is now managing Penn's computer center, and when the changeover of ownership is completed this spring, Penn, Drexel, University of Delaware, Villanova, Community College of Philadelphia, Bryn Mawr, Swarthmore and other institutions will be utilizing the facility.

According to Robert R. Logan, executive vice-president of Uni-Coll, this is the first time a voluntary computer center has been established to serve educational institutions throughout a region. "Because Uni-Coll is independent of any one institution, it can serve all institutional users fairly and without bias. No one institution will have priority on its services," he stated.

Pooling Computing Needs

By pooling the computing needs of many institutions into a single service organization, each institution can realize the economies of using a larger-scale computer, Logan said. Uni-Coll has ordered an IBM 370/165 to replace Penn's 360/75.

(CW Photo by V.J. Farmer)

Run Press Run

Pressmen check over the first press run at *Computerworld's* new printer last week in downtown Chicago. Larger circulation with its more complicated delivery schedules necessitated the change to Poola Printing Co.

Justice Gives IBM Antitrust Suit Top Priority

(Continued from Page 1)

more vigorously," one said.

"They will be very wary of accepting consent decrees from firms whose officials have in the past been large contributors to various political campaigns," he added, "and IBM officials have been known to contribute to both the Democrats and Republicans."

Other sources have noted that Arthur Watson, former head of IBM World Trade and brother of Thomas Watson, former president and chairman of IBM, is ambassador to France.

"With that type of connection, Justice will be especially hard on IBM so that it does not appear to be favoring administration appointees and contributors to the Republican cause," one said.

It also appears that Justice Department lawyers have stopped contacting computer industry personnel about their feelings of what should be included in a consent decree.

In the past year, the department has been secretly interviewing industry sources on the nature of a consent decree or final judgment that should be sought in the IBM case. But a Justice Department source said this type of activity has been stopped.

Antitrust personnel would not say whether or not they planned to refuse to accept a consent decree.

"Anyone is welcome to approach us with a consent decree at any time," they said, "and if we feel that it accomplishes as much as litigation would, we would accept the decree."

Wilson said that the division had committed more of its resources to prosecuting the IBM case than to any other now pending in the courts.

The division, Wilson said, has put its three most experienced antitrust trial lawyers on the case and that they are heading a staff of around 15 other lawyers.

The case, if it comes to trial, will be heard by Judge Daniel Edelson, the chief jurist for the U.S. District Court for the Southern District of New York, who also handled the last antitrust suit against IBM which resulted in the 1956 Consent Decree.

It is estimated that the case is around 18 months away from the earliest trial date and that the case could take an additional 18 months before being completed.

NAS Study Gets Lift

(Continued from Page 1)

are imminent, according to Mahoney.

The $100 million to be given NBS each year under this bill may not be enough, but if the government combines the new funding with earlier research projects such as Arpa's (the Advanced Research Projects Agency), "we should be able to retain our position of world leadership in computers," he told the group.

It is too early to speculate on the results of the study or on what NAS or other agencies might do with the conclusions, he said, but the study might serve as background material from which NBS, operating under the original Brooks Bill, would develop federal information processing standards.

Used in that way, the new study would be comparable to the telephone interconnection study the academy did last year for the Federal Communications Commission, he concluded.

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Poughkeepsie and Cambridge

IBM Feels Brunt of War Protests

By E. Drake Lundell Jr.
Of the CW Staff

As antiwar activities grow in reaction to President Nixon's new bombing raids inside North Vietnam, computer companies have increasingly become the target of protests.

And the publicity they are generating could make all DP installations, even those remotely connected with the military, potential targets.

More than 14 persons were arrested outside of IBM facilities in Poughkeepsie, N.Y., and an IBM office in Cambridge, Mass., was vandalized last week.

And other antiwar groups plan to grill Honeywell officials at the annual meeting today on its role in the Vietnam war and specifically on its participation in the electronic battlefield master control system.

The 14 arrested at the main IBM plant in Poughkeepsie were part of a group of demonstrators who attempted to maintain a week-long vigil outside of the offices to protest IBM's "complicity" in the war.

The group was arrested for trespassing when it attempted to camp on the lawn in front of the company buildings.

Other members of the group – which numbered between 50 and 100 – protested peacefully along the road leading up to the plant and were allowed to maintain their vigil as long as they didn't cross onto company property.

Sponsored by the Mid-Houston Non-Violence Center, the protest was aimed specifically at IBM's alleged involvement with the automated air war over Indochina – a subject which recently underwent congressional scrutiny [CW, April 5].

The protest gained the support of 23 members of the local clergy who stated that the demenstration "has compelled us all to confront the involvement of IBM products, and indeed our own complicity, in war in Southeast Asia."

In reaction to the demonstrations, IBM stated that "it is wholly impractical for any American company to refuse to do business with its elected government. To do so would be to foster anarchy.

"The American system vests political power in the people who have voting rights – not in corporations. Questions of war and peace, national security and diplomacy must, in the end, be resolved not by a few people who sit in corporate board rooms, but by individual citizens exercising their rights through the political process."

(CW Photo by M. Upton)

Boarded-up doors and windows greeted IBM sales office workers in Cambridge.

The damage done to the IBM Cambridge office came after a protest against an Air Force Recruiting office earlier in the day.

The protesters, estimated at about 200, broke into Harvard's Center for International Affairs ransacking offices and setting at least one fire in the building.

The demonstrators did not gain access to the IBM building, but did inflict over $6,000 in damages to the building by rock throwing, an IBM spokesman said. The approximately 100 demonstrators outside the office were routed after local police fired two warning shots, according to sources at the scene.

The protests expected today at the Honeywell annual meeting will primarily involve the firm's role in supplying bombs and other components to the military, but will also touch on the role of Honeywell computers in the war effort.

Clergy and Laymen Concerned charge that Honeywell "designed and deployed major elements of the electronic battlefield master control system now coordinated from Thailand."

The organization, which holds four shares of Honeywell stock, filed three resolutions to be taken up at the annual meeting, and the SEC ordered two of them to be included despite objections from Honeywell.

The first would call for Honeywell to reveal all its military contracts back to 1961 and the second would call on the company to consider setting up a committee to study the feasibility of conversion to peacetime production.

Calif. Colleges May Share DP

LOS ANGELES – The University of Southern California, Caltech and UCLA are studying the feasibility of sharing computing centers for greater efficiency and economy.

The National Science Foundation has awarded a grant of $144,200 to USC, Caltech and UCLA to help expedite their study of computing. These cooperative efforts were started last fall with the help of a $25,000 grent from the Rockefeller Foundation.

Dr. Z.A. Kepriellen, USC vice-president for academic planning and research, Provost Robert Christy of Caltech and Vice-Chancellor David Saxon of UCLA are leading the investigation of potential benefits their campuses might receive if certain resources were shared rather than duplicated.

"The nation's colleges and universities have been feeling the impact of a major financial squeeze for several yaers," Kepriellen said. "To maintain academic excellence, we need to turn to innovative methods. The three major universities in the Los Angeles area have agreed to a joint study of the sharing of resources as one possible means of helping to alleviate the common financial crisis. It is hoped that success in the joint use of some facilities, along with other measures to improve efficiency, may help to relieve some of the financial pressures at these three campuses," he said.

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At the CW Midwest Users' Forum...

(CW Photo by E.J. Bride)

Data 100 booth shows some of record Chicago crowds.

User Gets More From Extended Core

CHICAGO – A small computer user can obtain considerably

Operational Efficiency

more computing power with extended core, while possibly avoiding an upgrade or a costly cancellation of an inflexible third-party leasing contract, attendees were told during the operational efficiency forum.

Tom Bordner, DP manager at Steel Sales Corp., said users who have purchased their CPU and are seeking new applications could also benefit from core extensions.

"Add-ons in general may be purchased" from independent vendors than from IBM, the panelist said. This is especially true for memory extensions for machines like Bordner's 360/30.

No Software Changes

No software changes are needed for most extended core, he related. There may be minor changes for replacement memories, and hardware changes are also required if a user desires to do what Steel Sales did: extend the memory beyond the capacity guaranteed support by IBM.

Keynote speaker Charles P. Lecht advised attendees at the general session that "you could probably save 25% by leasing your IBM mainframe from a third party." About 80% of the attendees were IBM users, and 20% were still leasing from IBM.

Part of the 25% savings is also predicated on using independent peripherals, Lecht noted.

Leonard VanGorp of Inland Steel agreed there are savings in leasing from third parties; his two 360/65s are leased on this basis.

Inland Steel has used several peripheral equipment vendors, although many terminals and communications devices are still from IBM.

Panelist Wayne Frankhouser, vice-president of Alberto Culver Co., said his firm found the purchase of a 370/155 more economical than several 360s or a leased 370 CPU. Alberto Culver had two Model 40 processors which were costing the firm about $20,000/mo, Frankhouser said. A "re-leased" Model 50 would cost "about $3,000 less" than the two 40s, he said.

But a purchased 155 could be written off for a period of eight years, based on Internal Revenue Service estimates, Frankhouser said.

An in-house computer operations staff can often be "more stable" than an on-site facilities management staff, according to panelist John Dodd, data center manager at the Wilson Sporting Goods Co.

Wilson believes that centralized control is the best method to achieve operational efficiency, Dodd said. Over the past year, six proposals from remote sites for the implementation of a minicomputer have been rejected because central operations on the firm's 370/145 were found to be more cost-effective.

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Leased Lines or Dial-Up? Ask When Is Data Needed

CHICAGO – If a user can tolerate an error rate of 10% of his total transmissions, he can probably use dial-up lines to handle his data. James Brownell of Allstate Insurance based his opinion

Communications

on a study of dial-up service capabilities and recent operating experiences reported at *Computerworld's* Midwest Computer Users' Forum and Exposition last week.

Facilities on the telephone network are improving, Brownell said, but operation at 3,600 bit/sec is still difficult in many areas.

During a test run by Allstate, the firm found that with a good line transmissions with a block size of "about 5,000 bytes" can be completed on the first try 95% of the time on dial-up lines. As block length increases, the figure drops, and a block length of about 15,000 bytes can be completed on the first attempt about 60% of the time, Brownell said.

In evaluating AT&T equipment, Brownell said users should plan to replace Bell automatic call units "every six months" to avoid a degradation in the quality of transmissions.

Panelist Art Lemay of Trans Union Systems told users of his experience as the first Microwave Communications Inc. subscriber. There have been no installation problems between Illinois Bell and MCI personnel and all interfacing has been accomplished with good cooperation from both carriers, he said.

When called in to fix a data transmission problem, Bell personnel will talk over a line and tell the user that it is in good shape, Lemay said. But often a line that works fine for voice may still have problems when used for data, he said.

Installing a data communications network enabled the Marquette Cement Manufacturing Co. to reduce staff at outlying locations, and even close a few offices, said panelist George Wooten, director of data processing and communications.

In evaluating between leased lines and dial-up for data communications, Wooten suggested

Chicago's a Record

The Chicago forum was expected to draw a record 700 users, and exposition attendance was expected to top 3,000, another record for the *Computerworld*-sponsored conference. The Careven's last stop is Detroit this week.

the considerable overhead involved in dial-up systems should not be the overriding factor. "When do I need the data?" should be the question users ask themselves, he noted.

In some cases, data might be transmitted to a remote office in 10 minutes, then spend two hours in local administrative procedures, he stated. While response time is probably the biggest factor in selecting a dedicated circuit, the actual needs of the user for immediate response are important in the selection process, he said.

In planning the expanding communications network of the Blue Cross Association (BCA), independent vendors proved helpful, noted panelist Ann Khim.

Using Western Union's Datacom service, which provides multiplexing in 45 cities nationwide, BCA saved 10% of its communications costs, or about $6,000/mo, she noted.

Cassette-Oriented Terminal an 'Evolutionary Step'

CHICAGO – The cassette-oriented intelligent terminal should be regarded by users as an "evolutionary step between the keypunch unit and direct on-line data entry," This opinion from Richard Allen, workshop leader on intelligent terminals was voiced during the data entry session.

Allen, director of MIS at Con Agra Inc., said that in his network of 14 Sycor terminals data at each remote site is batched on cassettes for later 1,200 bit/sec transmission to a "central terminal" which transcribes the received information onto computer-compatible tape.

At the workshop on OCR scanning, O.E. Stolberg of United Airlines described some problems in accurately more than 2.5 million flight tickets per month.

The majority of rejected OCR documents are caused by foreign information in the scan field, Stolberg said. These include rubber stamp ink, handwriting, smudges and gummed stickers, Stolberg explained.

Through careful monitoring, the United OCR system has reduced flight ticket rejections from an initial 33% in 1965 to a low of 3% today, Stolberg said.

Stolberg agreed with users in other cities visited by the computer caravan that many people are "still afraid of OCR."

Keynote speaker George Bernstein, special assistant to the director of research and development, Naval Supply Systems Command, explained this reluc-

Data Entry

tance: OCR represents a "revolutionary change" within the "evolutionary environment" of data entry.

Slowing the trend towards more advanced data entry systems is the "IBM approach" to two users of equipment, which Bernstein detailed as improving existing equipment (the buffered keypunch) rather than introducing a new technological concept.

The Midwest Forum's panel represented a slight deviation from the usual format, in that two users of different shared-processor systems appeared on the panel, and collaborated on their workshop. Harry Coolidge of Burlington Northern represented the large-user viewpoint, while Walter Hoffman of Agricultural Records Cooperative (ARC) represented the medium-sized users.

ARC was the second user in the country to sign with Entrex, and the keypunch staff was soon reduced to 17 from 22, he commented, adding "they're getting out more productivity (becomes more pay) were avoided by explaining to the operators that this type of equipment actually made their jobs easier.

Employee relations were further improved, he noted, by having representatives from General Computer Systems, the data entry equipment vendor, talk with lower-level employees, to discover their attitudes toward the equipment. Some system software changes were effected by these human interfaces, he noted.

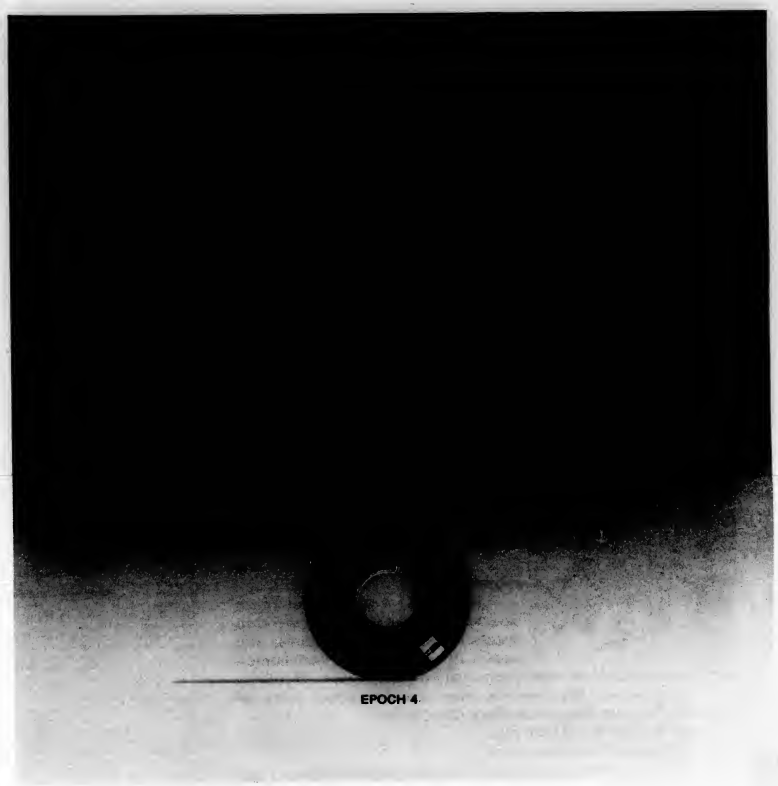
Rather than boasting about technology or input speeds brought about by direct data entry techniques, said George Davison of International Harvester, computer users should first ask themselves what the output needs are.

Need for Quick Output

Technology advances cannot be considered "in a vacuum," he noted. The criterion for evaluating the significant cost involved in direct data entry should be the need for quick output, not input, he said.

Dsvisson also tried to dispell a myth regarding competitive advantages from computer usage. He said there was "nothing secret, nothing proprietary" about his extensive system: "I can't think of a major competitor that didn't spend a day with us," learning about direct data entry, he noted.

International Harvester spent 480 man-years developing the software for its system, and Davisson does not see a technological end to its use. Programming changes are made daily, he noted, but there is no "hard termination" to his system's usage.



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By Molly Upton
Of the CW Staff

ALBANY, N.Y. – Operation of the state's central data processing facility "under a full data processing service concept, rather than under the present concept of primarily selling computer time," is the principal recommendation of a report submitted by the Office of the State Comptroller to the Office of General Services (OGS).

The central DP facility "currently provides for the sharing of computer equipment and does not include related processing functions, such as consulting and systems analysis, software usage and programming," the report notes.

The report also calls for the establishment of a statewide committee to study the feasibility of coordinating procurement of DP hardware and services by all state agencies.

Other Recommendations

Other recommendations submitted to improve DP operations cover operating procedures, library standardization and backup, resource billing, tightened security measures, more communications with users and control of in-house procedures.

The OGS should be able to schedule work a week in advance, to assure effective utilization of equipment, the report states. To encourage user agencies to submit plans, the report suggests charging a premium for priority runs that interrupt the regular scheduled processing cycle.

The tape library should be enclosed and supervised, the report states. Officials noted that although the library is still not enclosed, but within the computer room, it is protected by improved controlled access to the computer room itself.

The OGS should "develop or acquire the means to measure utilization of software packages and other special devices." Agencies should be advised of all available software packages in an attempt to increase use of the packages." The report notes almost $1 million was spent last year by 10 agencies for the rental of software packages. At least three agencies leased the same package.

One standard should be established for the control of all tapes, many of which are owned by the individual agencies. This would include standard labels and tape names. OGS should look into the feasibility of owning all tapes used for processing, "since ownership would give an incentive for tighter tape control," according to the report.

OGS should review the "Service Analysis Report" to ensure proper allocation of all errors so that problem areas can be analyzed and corrected. The report cited instances of errors on the weekly report and "unknown software errors were listed as agency errors and never corrected when the errors became known."

The committee recommends that resource billing, rather than time utilized by the CPU, be used as soon as practicable.

Officials indicated an equitable billing system had been installed since the preparation of the report.

Specifically, the report recommends that some general and technical supervisory salaries be included in computing the rate, while costs of operating the keypunch and tabulating services be excluded from the chargeable rate and billed "directly to the OGS internal operations" using these services.

The section on security recommended that access to the computer room be restricted to authorized personnel, and protection against fire and power failures be strengthened.

The OGS should review its internal backup procedures and improve the off-site storage, the report states. Currently, copies are kept of internally created programs and systems programs, but OGS does not maintain off-site storage for procedures, documentation for systems and programs, operating procedures and emergency plans, it says.

Controls on in-house programming and systems should be initiated, according to the report. Estimated costs of system design, programming, testing and conversion costs for proposed projects should be included in the study of project feasibility.

Strengthen Communications

As part of the concept of a full service DP center, OGS should strengthen communications with the user agencies to "assure that all phases of processing are coordinated and that problems are resolved promptly."

OGS should offer systems analysis, programming analysis and adequate data control. The existing advisory council should help keep all users "abreast of current situations and solicit their suggestions . . . The users' opinions should be given serious consideration before major decisions are made affecting the operations or future of the computer center."

The establishment of application managers who would be responsible for coordinating all activities for a certain user or group of agencies would also further communications, according to the study.

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Special Report

Output Techniques, Part IV

Users Neglect Versatility Of CRT as Output Device

By Ronald A. Frank
Of the CW Staff

The visual display unit is usually associated with key entry and other terminal applications. But the CRT can also serve users as an output device in certain applications.

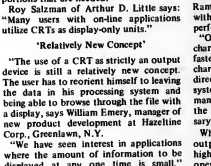
While most users rely on the printer to capture CPU output, many realize that a CRT, together with some type of hard copy unit, gives them the flexibility to scan available data and capture only those portions that are needed.

Roy Salzman of Arthur D. Little says: "Many users with on-line applications utilize CRTs as display-only units."

'Relatively New Concept'

"The use of a CRT as strictly an output device is still a relatively new concept. The user has to reorient himself to leaving the data in his processing system and being able to browse through the file with a display, says William Emery, manager of new product development at Hazeltine Corp., Greenlawn, N.Y.

"We have seen interest in applications where the amount of information to be displayed at any one time is small," Emery notes. These applications include airline reservations and police vehicle dis-



Flight information for Ozark Airlines is output from a CPU to this Bunker Ramo CRT.

patching where new information is updated "in place on the screen," Emery adds.

Hazeltine offers a terminal printer with its 2000 display, Emery states, explaining that some users want to be able "to walk away from the terminal" after they have captured the information they need. The firm expects to add an impact printer to the 2000 CRT system in the near future.

The major early application of the CRT was the stock quotation service, Salzman explains. And the company that made significant contributions to this type of CRT application was Bunker-Ramo of Trumbull, Conn.

In addition to the latest prices, Bunker Ramo also provides the financial industry with trends and analyses of stock market performance.

"Our CRTs can communicate at 300 char./sec. compared with some of the faster impact printers that operate at 165 char./sec," according to Dick Marnell, director of management information systems marketing at Bunker Ramo. "In many applications only a small part of the hard-copy printouts is really necessary for the user's operation," he says.

While the CRTs can keep up with CPU output transmitted at 2,400 bit/sec and higher rates, Marnell concedes that an operator monitoring the display cannot read at this speed. But a buffer can store the received data until the viewer can digest the data on the screen, he adds.

One important application area for the CRT involves the user who is "exploring an inventory listing," Marnell says. "The user may be interested in only a small portion of a listing that could be 12 or 15 pages long. By first paging through the material on a display unit, he can select and print "locally" only the data he needs. And this type of application helps to avoid "printing queues" where operators are waiting in line for their printing jobs, he notes.

While the CRT is useful as an output device, Arthur D. Little's Salzman sees implications for other parts of the user's DP system. "In a communications environment, the user can 'get away cheaper' with CRTs than he can with a remote batch terminal. A typical CRT costs $4,000 while a batch terminal can cost $20,000 or more," he estimates.

But in order to implement CRT access of CPU data, the user has to have a "massive on-line storage facility" available at the processor, Salzman says. "You wind up with a great deal more storage and additional CPU power to support remote CRTs," he adds. "And people understand that when they go to a CRT-oriented system it is going to cost them more than their batch system even though the communications line cost remains the same."

One user that has relied on CRTs since 1967 is Atlantic Richfield in Philadelphia. Heating oil is delivered to more than 30,000 customers based on data stored in a 370/155 and accessed via Bunker Ramo CRTs.

"All of the information on the customer master file can be accessed on the display tubes. And it takes two displays to call up a complete file for each customer," according to Henry R. McDowell, a systems analyst with the oil company.

"We can monitor degree days, date of delivery and the customer's credit rating and account status on the tubes," McDowell claims. When a CRT operator determines from the displayed data that an oil delivery should be made, "we then key in a request for a delivery ticket at the CRT and a nearby printer generates the necessary customer information," McDowell adds. These tickets are then handed to a radio dispatcher who transmits the information to one of about 40 oil trucks in the field.

The CPU and the CRTs are about five miles apart, McDowell says, and data is sent to the displays via dedicated 1,200 bit/sec phone lines equipped with Bell 202D modems. The system began with an IBM 1410 CPU, then moved to a 7010 and 360/50 before the 370 was installed, he adds.

The biggest benefit of the processor-to-display system, McDowell claims, is "the elimination of a 300,000 card tub file." The system uses 14 CRTs and two printers, on-line at all times and is "extremely reliable," McDowell says.

While the CRT device makes a valuable output peripheral, some see it as a vital cog in a larger configuration. Sanders Data Systems, Nashua, N.H., has utilized the display as part of its "Can Do" intelligent system. "The CRT is only one of the tools needed to interact with a

(Continued on Page 9)

...TV Receiver to CRT Display

One company that offers users a low-cost method of adding CRT capabilities to their system is Ann Arbor Terminals in Michigan. For about $695 and an ordinary TV set, the company can provide 256-character screen display with page/roll option to a teletypewriter user.

The Ann Arbor system uses a display driver that can transform any standard 525-line TV receiver into a CRT display device. "If you add a CRT to a conventional teletypewriter, you have the advantage of transmitting to the display at 1,200 bit/sec, and when you want to print out you transmit at 110 bit/sec," says Ed Zimmer, Ann Arbor's president.

Closed Circuit TV System

The firm can configure a CRT system for a user with the various system components that it supplies. The driver, or controller, can be interfaced with any video monitor system. One natural application is a site with a closed-circuit TV system, Zimmer says.

This type of user includes colleges with video monitors in the classroom. The addition of the Ann Arbor controller allows students to monitor CPU outputs on the same screens, Zimmer notes. The firm also provides a video monitor and a keyboard which can be interconnected to give the user who wants to configure his system in segments a complete CRT terminal capability.

"A controller that will display 16 lines of 80 characters in a serial receive-only interface costs about $1,015. And this type of unit could be added on to any printing terminal," Zimmer believes. A 9-in. video monitor is available for $130 but any TV set could be used, he says. A keyboard can be added for $250.

Computer Communications Inc. in Los Angeles has a 301 display controller that can operate with a standard TV set. It can be used as part of the CC30 Communications Station to display either black and white or color, depending on the type of video monitor selected by the user.

Plotters Can Expand Terminal's Range Using Graphics

Many users operating with a significant amount of graphics feel their output requirements can be handled by a digital plotter which will accept data directly from a CPU and generate a vector, graph or chart.

There are two main types of plotters. The roll-fed or drum plotter is designed for the user that needs production output of graphics. This device is generally used with scientific CPUs on-line. The second is the larger and slower flat-bed plotter used to generate patterns and engineering drawings.

There are several companies specializing in interfacing this kind of plotter.

"We supply off-the-shelf interfaces for 25 to 30 computers including some foreign ones," says Calcomp's Jim Pyle. The firm can supply a roll-fed unit for about $5,000 with an additional $1,500 to $2,000 for the interface, Pyle estimates.

For the user with a need for both printing and plotting output, Varian Data Machines of Irvine, Calif., has its Statos electrostatic line of printer/plotters operating at the 1,000 to 5,000 line/min range, and can be equipped with a controller and tape transport for off-line uses, according to Richard Barck, Varian's product manager for graphics products.

"The 360 user could add a Statos unit for about $15,000 with a controller and tape deck to accept 'plot tapes,'" Barck says. While business DP sites tend to run printer/plotters off-line, Barck sees mini users with these devices operating on-line in scientific environments.

Daniel Heather, manager of printer products at Gould Inc., Data Systems Division, Newton, Mass., explains: "The simplicity and reliability of non-impact printer/plotters is a big plus. A user has higher output speeds, very quiet operation, and above all, format flexibility which allows both graphic and alphanumeric data presentation.

"These units fit in with the trend toward graphic reporting in management information systems," he says. The firm is devoting extensive research in the non-impact printer/plotter area, a spokesman says.

One company aiming its printer/plotters at time-sharing users is Hewlett-Packard. "The user can plug our unit right into his time-share terminal so that as he is getting data printed out, he is also receiving a graph," says John Deans, sales manager at HP in San Diego.

"The plotter is easy to use, requires no software drivers and really expands the capability of the user's terminal with graphs as well as alphanumerics," Deans states.

This Calcomp roll-fed plotter system can operate off-line from CPU "plot tapes."

'Relatively New Concept'

Users Overlook Hard-Copy CRT Devices for Output

(Continued from Page 8)

CPU and it should be used in conjunction with a keyboard and printer," says Tom Colligan, marketing manager. "CRTs are quiet and lend themselves to handling high-speed data a lot better than a printer.

"The CRT is the way to converse with a CPU. It is actually a control panel. The user looks at it and decides on the data he needs," says Colligan. Although he agrees that a printer is the ideal way to generate a hard copy when needed, Colligan asks, "As long as you have a CRT why capture the data at all?"

Some users favor capturing displayed information without a printer. They rely on the so-called hard-copy CRT devices, which are usually a non-impact page printer of the thermal, optical or electrographic type.

One company that incorporates a hard-copy capability into its CRT unit is Photophysics Inc. in Mountain View, Calif. The display screen includes a slot that issues a "page" copy of the data on the screen. The paper copy is about 4-1/2 in. by 5 in. and it can be produced in a few seconds after pressing a print key on the display's keyboard.

"The particular advantage of our CRT, which is compatible with the IBM 2260, is that the user can get a hard copy in five seconds for less than a cent by simply pushing a button," says Dr. Ivor Brodie, chairman of Photophysics.

"The important thing is that the hard-copy generation matches the speed of the CRT," Brodie says. The Photophysics unit is described as an electrophotographic copier with "a second CRT display that is photographed" to produce the paper image.

In addition to being plug-compatible with IBM displays, Brodie says his CRT

The Photophysics CRT can produce a hard-copy sheet from the slot in several seconds.

unit can be used with Univac and Model 33 Teletype systems. "The cost of our CRT is about the same as a device without the hard copy, so essentially the user gets the hard-copy capability for free," Brodie notes.

The CRT is interfaced to users' systems via an "optical coupling that requires no electronics or software changes," Brodie adds. The Photophysics hard-copy CRT costs about $3,500.

Another firm that sees a need for the hard-copy CRT device is Tektronix of Beaverton, Ore. The company supplies a device that produces a standard size 8-1/2-in. by 11-in. copy of the screen display. "Our hard-copy unit lends itself to use with the graphics type of terminal," says Jerry Ramey, marketing manager for display and hard copy.

Bob Peterson, marketing manager for computer display products at Tektronix, says: "We have CRT software packages that can graph any kind of historical file such as an order processing system. The user can graph information to show a trend in such areas as accounting. A two-dimensional graph is much more meaningful to the manager than a numeric listing." The Tektronix software can run on 360/40s and up under OS/MVT or MFT, Peterson believes.

Although display devices can be used as monitors in many applications, each unit does not need a full terminal capability. Using this concept, some users install a hierarchy of display units.

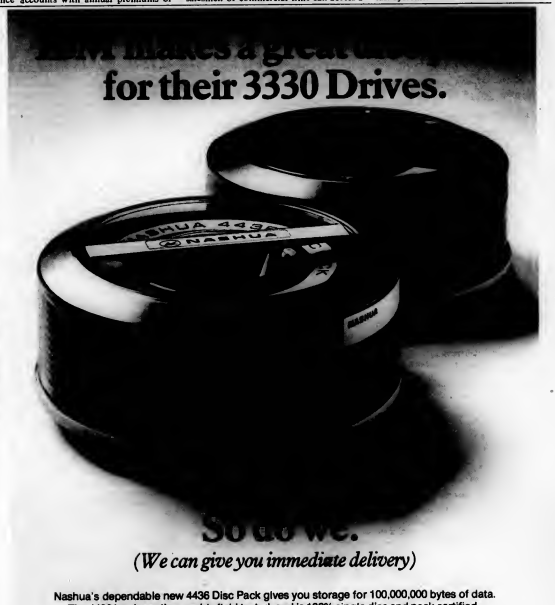
"Users don't need a full character generator at each CRT location," according to Frank Richins, western sales manager for Beehive Medical Electronics Inc. in Salt Lake City. "Somewhere in their system they may have a full video teleprinter, but this unit can easily drive several receive-only video monitors," he says.

Among the applications for CRT output are insurance file access and broadcast information management. At the Hartford Insurance Group, 20,000 policies are stored on a 370/165 and accessed via CRT displays. Used primarily for insurance accounts with annual premiums of

The IBM 1130 can be interfaced with the Tektronix hard-copy device (left) to generate graphics.

$100,000, or more, it would be virtually impossible to duplicate the system in a hard-copy format, according to James Smith, director of operations research. The system will be expanded to include claims information, he states.

At TV station KTTV in Los Angeles, salesmen of commercial time can access a 360/40 to show prospective buyers audience profiles of shows which relate to the market segment they want to reach. A potential daytime advertiser could get a CRT display of the typical viewer that might be watching a certain program, says James Foley, project manager for broadcast systems.



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NASHUA

Editorial

Time to Recheck Security

The antiwar factions again are focusing some of their attention on the part that computers now play in war.

The publicity they are generating could lead to attempts to destroy computers even remotely connected with military work.

Without waiting to find out if this will occur, all installations should carefully consider whether they might be a target for such an attack. If the answer is yes or maybe, now is the time to review installation security and to beef it up as necessary.

And keep in mind that an attack may not be a physical one. There already has been an attempt to overload the Internal Revenue Service's installations by having people file dozens of phony income tax returns.

Letters to the Editor

Manager Must Always Be Aware of Changes

Arthur T. Hill [CW, April 5] has my sympathies – management decisions that require system changes without adequate time for checkout are unfortunate, and often very expensive and embarrassing.

I do not know the situation in Delaware, but I do know that in many similar cases DP managers have been needlessly trapped in these situations by their own failure to be aware of changes that might be imposed on them. For instance:

- Attorney's general's rulings do not usually arise from thin air, but from requests for rulings by legislatures, governors or powerful citizens groups.
- Top management decisions are often preceded by some kind of politicking among middle management, top management or among individuals on the board.
- Changes made to better serve the market are commonly the result of pressures generated in that market.

The point is that the DP manager should keep his ear to the ground, his eye to the keyhole and should cultivate a number of people who will catch wind of a change while it is in the talking stage. At times, I will concede, requirements for changes occur as if out of the blue, because preliminary discussions were kept secret, but this is not as common as is thought.

And when the DP manager hears of a possible change, he should have the resources, and the flexibility, to do most of the work that may be required (perhaps all, save the coding) knowing that 90% of the time nothing will come of the rumor, and the work will have been "wasted."

But it is no waste if one time out of 10 it saves the DP manager's neck and the goodwill of the public, the consumers or the electorate.

T.D.C. Kuch
Bethesda, Md.

Hardware Market Growth No Guarantee of U.S. Software

This letter is in reference to the article on "Packaged Products Spurt Predicted" [CW, March 29].

An econometric model of the software market that I am developing shows software sales are more a function of the value of computers in use than actual hardware shipments. The relationship is, as the article indicates, based on a lag of a one-year period.

It is also interesting to point out that, perhaps not unexpectedly, the relationship between the value of U.S. computer hardware in use in the international market and sales revenues to U.S. software companies is a negative one.

In other words, the growth of the computer international hardware market does not ensure expansion of U.S. software exports.

Andrei Glasberg
Associate Director
The University of Wisconsin
Computer and Management
Services Division
Milwaukee, Wis.

1403 Replacement Praised, Quality 'Just as Good'

Your Special Report on independent printers [CW, April 12] was very well done. However, you did not mention the Mohawk 1403 replacement.

Since November 1971 we have had a Mohawk 3166 printer attached to our 360/22. This printer has a 160-position print line and a 64-character set with a self-contained controller, eliminating the need for a 2821 for those, who like us, do not have a 2540.

The 3166 operates at 625 line/min. We are planning, in the near future, to upgrade our 3166 to a 3160 which will operate at 1,250 line/min.

We have been very well pleased with this printer and would also rate the print quality at least as good as the 1403.

Thomas W. Dowling, CDP
Manager, Data Processing
States Steamship Co.
San Francisco, Calif.

All Project Team Members Must Be Professional

By A.M. O'Reilly
Special to Computerworld

Don Smith finds difficulty with Dick Brandon's position that "programmers need to become more professional . . . need to establish a programming discipline and a programming ethic - totally separate and distinct from systems analysts" [CW, April 12].

Smith states that the technological complexities of building flexible-response systems require that systems analysts be steeped in technical details of programming, PCB generation, multi-tasking, access methods and machine utilization.

He states that the systems analyst is the principal means of communications between functions and therefore is more important than documentation.

Why Not Successful?

I agree with Smith's statement that the methodology proposed by Brandon has been with us awhile and that there are few examples of spectacular success.

The reason that success has not been forthcoming is found in the last sentence of Smith's article. "You can hire professionals . . . and you can create an environment that will allow him to do the work he is capable of doing."

For a professional to work "professionally," it is necessary that an environment exist which recognizes the required disciplines and skills of the professional. Unfortunately, few users or managers recognize the need for careful building of systems. They impute the speed of computer processing to the methodology required to make a computer process.

No company president would make a decision to build a new warehouse and expect to have it occupied and functioning in six months, nor would he expect that the entire job could be performed by the construction contractor.

He recognizes that efficient functioning of the facility requires interaction between his marketing, production and transportation divisions as well as the expert services of architects, engineers and the construction trades. Before he made the decision to build the warehouse he received thorough analytical studies based on markets, distribution patterns, company growth and financial considerations.

Viewpoint

How often does that same company president direct the implementation of a complex order-entry inventory control system based on little more information than a salesman's pitch and with no understanding of the steps and sequence of developing such a system or the costs for development and operation?

Define the Skills

The challenge of the '70s is not to create a systems analyst who is some sort of superman knowledgeable about every facet of systems technology, but rather to define the methodology and the functions and skills which must interact to successfully meet the demands.

The assembly of project teams consisting of analysts, programmers, systems programmers and users is an excellent methodology provided that each of the participants brings a known, proven set of skills to the team. If the analysts are merely programmers with five year's experience and the programmers are fresh out of coding classes, the chances of success are low no matter how dedicated the project team.

On the other hand, if the analysts include personnel trained and experienced in analytical techniques, data base construction and control, human factors engineering, methods and procedures, telecommunications and production engineering; if programmers include personnel who understand and practice standard, modular design of programs and who understand interaction of operating systems with application programs; and if users understand that system design does not mean automating current procedures but includes realignment of functions and organizations, developing and supervising new skills, and operating differently than in the past, then the dedicated project team has a chance of success.

The chances are improved substantially if the environment includes management who understands that it must set objectives, must select from alternative approaches to meeting the objectives, and the alternatives are frequently tradeoffs between the degree to which objectives are achieved, costs and the time required to accomplish.

Such an environment must include an information system which documents or communicates the status of projects in terms of progress toward objectives, costs incurred and time expended and remaining.

The need is not merely for professional programmers but for professional analysts, designers and managers. Separate career paths do not preclude transfer to different careers if ability and inclination so direct, but they do provide that positions within each path are filled by individuals of demonstrated skill, knowledge and experience.

A.M. O'Reilly is vice-president of Brandon Applied Systems, Inc. in Arlington, Va.

Programming Course Unusual

Coleman College Good Challenger, But Not Perfect

Coleman College of San Diego, which recently challenged the other data processing schools in the country for the title of "best data processing school" [CW, March 29], is a worthy challenger. If you visit the campus in the middle of San Diego Old Town, you will probably be inspired by the openness.

The campus itself, with its open courtyards and the staff offices, with their open grill work so that students can easily approach the faculty contribute to this feeling. More to the point is the openness with which the school treats both its students and also the employers who hire the graduates.

The Taylor Report
By
Alan Taylor, CDP

For instance, many figures normally brought out are systematically developed by Coleman and are available for the asking. The dropout percentage is an example. That is the number of people who, after enrolling, do not complete the courses. Many schools do not publicize this figure. Coleman was rather proud of its figure of 7.6%. It is also proud of its placement records. During 1971 (which was a bad year), of the students who asked to be placed 75% were successfully placed by the school placement office. In other years the figure has been as high as 95%.

Systematic Operations

Underneath this openness, however, there is not an accidental pride in the placement percentage – nor in the small number of people dropping out before graduation. Coleman has approached the matter from a systematic point of view.

One way of keeping the dropout figure down is to ensure that students only enroll if they are really going to work to complete the course. Coleman approached this in two ways.

To start with it instituted fairly tough, double interviewing techniques, to ensure that the students did realize it would be hard work, and that jobs were by no means guaranteed.

Finance Problems

Then Coleman attacked what is often a key problem – the student's financial situation by ensuring that the students have access both to federal and other funds, and also to suitable part-time employment. All the janitorial work on the campus is done by students who are also placed in hospitals nearby. This helps prevent financial worries intruding unnecessarily on the students' concentration.

Coleman takes a similar approach – that is, a systematic one – to keeping its placement figures up. A very pleasant interview room is available, with records of the students' progress and strengths available to the student and the employer. The college does pay Nick Sakellarion, its placement director of the last four years, by commission. Also, when the employment market for entry-level graduates softened in the San Diego area, Coleman reduced its enrollment to match supply to need. It uses, as well as teaches, systems to help the students.

It is no wonder then that Coleman can afford to be open about its figures.

These are all the marks of a good school, but after visiting it twice I feel Coleman is probably more than that. As I have reported to the judges of the Furr Challenge Cup Contest, I think Coleman has two quite exceptional approaches to DP education that deserve serious consideration by many other schools. One involves a teaching aid, and the other a method of structuring programming courses.

Power of a Table

Teaching aids are a favorite hobby of the school's director, Coleman Furr. He uses the school television studio and a videotape library in the various lectures, not merely in the DP institute, but also in the secretarial and law stenographic institutes of the college. The films, which can be used in the classrooms or in the lounge by the students, can show methods of sorting, compiler printouts and many other subjects quickly and graphically.

But while Coleman believes in modern technology, it also believes in using some of the older crafts. In this case carpentry proved the answer.

Perhaps the best teaching aid I saw in Coleman was the design of the tables! There were pentagonal ones – that is, they had five sides.

Sitting in on some of the lectures I found a very effective organization for a DP classroom. Two of the sides were generally towards the instructor and three students sat at the rest of the table. There was plenty of room for printouts and manuals.

Group discussions, when appropriate (which was fairly frequently during the exercises), seemed to be much more productive, and much more under the instructor's control as they were carried on by the students around a particular table – rather than either the free-wheeling discussions I have watched in other classrooms, or else the stultified silence that replaces them when an instructor must bear down on the class.

Here the students at each table seemed to be able to carry on their own team work without disturbing the rest of the class, and yet derive considerable benefit from the discussions. (To say nothing of having room for those printouts!)

The other major factor that distinguished Coleman was the programming techniques used. The college teaches programming as a subject – and various programming languages as particular examples of programming languages!

The course is structured by starting out with a truly English language set of programming. An application is programmed accurately and carefully in English – not in Cobol.

After that, the students should understand the application and the general techniques of programming.

Then the instructor introduces high-level languages starting with PL/1. He does not give the students the manual, but he does give them enough of the language to rewrite the application from the English version into the PL/1 version.

Naturally, as the students do this they discover a few more programming techniques, so it is not a complete transcription but a genuine learning of a different language, and improving their knowledge of programming.

Now the students study assembly language. Again they repeat the process of taking an application and putting it into the computer-term, doing the operations themselves. But now they see how it works in the hardware itself.

The students then study the third programming language, Cobol, which for many will be the prime working language. Now they can see how its structure compares with other languages, and with the actual application that has to be done, thus giving them an unusually good basis to appreciate what Cobol really is and how it operates.

The final test comes after the Cobol applications have been completed and tested. By now the students can almost consider themselves veterans of four languages – and like veterans they have to meet their major tests of becoming independent. They get an RPG manual and are told that, since they already know programming, they should be able to take the manual, write a program, punch the cards and run the program. All without more than supervisory help from their instructors. (On the whole they succeed, too!)

I have never heard of a programming course that started with PL/1 and ended with RPG, and I really do not think that I have heard of many courses that teach programming as opposed to particular programming languages. But I do know that in talking to the students and to the graduates of the school, I found they did have an unusually good grasp of what programming languages really are.

Personally, I think that as languages develop these students will find this training giving them unusually good preparation and better than many programming courses that I was previously familiar with.

But Not Perfect

However, all of Coleman College is not as good as that. There were some criticisms I had to make – in fact, there were several of them. Under the contest rules these criticisms are confidential, but Coleman is making them available – together with the responses – to any other school or alumni association entering the challenge.

If your school or alumni association wishes to enter, or to obtain copies of the papers involved, consult the box on this page for details.

How to Enter Furr Challenge Cup Contest

1. The competition is open to any data processing school in the U.S. Whether the school is public or private, or whether it is solely dedicated to data processing or not, is no matter.

2. The school can be represented by its administration, its current students or its alumni. These may work together or produce separate entries.

3. The Furr Challenge Cup will be awarded to the school which most proves it is the best data processing school in the country before the closing date for entries (July 1, 1972).

4. An entry should contain five separate reports showing the quality of the school's work, and the problems that are hindering its further improvement of quality. The reports should be entitled:

"How XYZ School Excels in Looking After Its Students' Interests."

"How XYZ School Contributes to Improving Data Processing Technology."

"How XYZ School Contributes to Improving Data Processing Education."

"How XYZ School Assists Data Processing Relations With the Community."

"What Prevents XYZ School From Being Even Better Than It Is."

In addition, copies of curricula, lecture notes, etc. should also be provided.

5. Schools intending to enter should notify Paul E. Salcido, Fotomat Corp., 920 Kline St., La Jolla, Calif. 92037.

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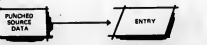

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The Format

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9:40-10:30 Panel discussion led by regional experts chosen for their progressive management principles. Questions encouraged.

10:40-11:45 Workshops – panel members conduct separate workshops. Your specific questions fielded, worked out.

12:15-1:30 Conference luncheon – keynote speaker summarizes chief points covered during panels and workshops.

1:00-7:30 Exhibits open, stay open 'til 7:30. Exhibitors will show the latest in hardware, software, services.

The Subjects

First Day: Data Entry

Keynote speaker; Lawrence Feidelman, President, Management Information Corp., Cherry Hill, N.J.; Editor, *Data Entry Today.*

Panels and workshops will be grouped by these four subjects:

- Keypunch replacement; key to tape, disc and cassette devices.
- OCR.
- Intelligent terminals – distributed processing.
- Direct data entry/source data automation.

Second Day: Data Communications: The Choices

Keynote speaker; Dr. Dixon Doll, Data Communications Consultant, faculty member, Graduate School of Business, Eastern Michigan University.

Panels and workshops will be grouped by these four subjects:

- Communications equipment from mainframe makers and common carriers.
- Communications equipment from independent suppliers.
- Data transmission via private (lines, microwave) networks.
- Data transmission via carriers (lines, microwave).

Third Day: Operational Efficiency

Keynote speaker; Charles Lecht, President, Advanced Computer Techniques, N.Y., N.Y., author of *The Management of Computer Programming Projects.*

Panels and workshops will be grouped by these four subjects:

- Core extensions.
- System/utility software modifications.
- Independent peripheral usage.
- Dedicated systems vs. general purpose computers.

Panel Members & Workshop Leaders

The regional experts who will run the panels and workshops have been chosen from a wide range of firms and institutions. Some will participate in more than one session, depending on their experience and expertise.

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Centralized W. Va. System

Counties Slowly Join Remote Batch Tax Processing

By Molly Upton
Of the cw staff

CHARLESTON, W. Va. – Both the state and its counties stand to gain from West Virginia's centralized version of DP sharing which involves processing of property taxes, according to Dr. John Cooke, director of CBM, Inc., developer of the system.

Under the system, counties avoid the danger of being "oversold" on DP equipment, obtain current data from the remote batch system, and still perform the functions of assessment, billing and collection of property taxes.

The system allows for state involvement to assure appraisal standardization, which could be important in retaining the property tax as a means of educational support, Cooke noted.

Strong Support

The concept of a state-county remote batch system received strong support from Gov. Arch A. Moore Jr. and tax Commissioner Charles A. Haden II, said Michael Huffman, state coordinator for the project.

Based on an already existing central state DP center, the system was developed by Cleveland-based CBM under a grant from the Appalachian Regional Commission which covered three-fourths of the cost. The state also financed the project.

Six counties have signed up for the system, called the centralized remote batch processing for property taxes, and Cooke anticipates 22 counties will be involved by July. "It took quite a bit of salesmanship as a lot want to wait until others come on," noted Huffman.

There is a "certain amount of reluctance on the part of counties for fear the state will assume control, but the county still has control since it keeps the data. This relieves them of clerical work," he said.

Record Conversion

With the system a county performs its own record conversion, under guidance of CBM, acquires a key-to-tape terminal and printer and pays for processing time on the central computer. Data is transmitted over phone lines, processed in Charleston and appears in final form on the county's printer.

In its first year of using the system, Kanawha County, home of Charleston, is over $1 million ahead in tax collection, Huffman said.

Two Plans

The system comes in two forms: a basic plan, as would be used by counties – without addresses of taxpayers, and a more extensive plan, which Kanawha uses.

Kanawha's costs for the first year, including conversion and training, were about $121,000 and succeeding years' costs are estimated at about $48,000 per year, according to Cooke. If Kanawha leased its own computer, costs would run about $300,000 for the first year and $100,000/yr thereafter, he estimated.

The system's major outputs are:

- Tax books for real and personal property.
- Tax statements and bills.
- Personal property information, which the county updates on its terminal.
- Constantly revised real property data sheets which contain full descriptions of the property.
- Cash journals.
- Cash position statements, showing taxes paid and unpaid by district.
- Distribution of taxes.
- Delinquent tax books.

Taxpayer Convenience

The system also provides details for the taxpayer's convenience. Each tax statement has two stubs, one for each half year, and the taxpayer can see exactly what he must pay depending on the month of payment. For example, if a person paid in January, he would get a discount, but if he paid for the first half year in July, he would pay more for the first half, but would get a discount for prompt payment of the second half year.

Spotlight on Sharing

Property data is retrievable in a variety of forms. For instance, the assessor can retrieve a list of three bedroom, two-car garage properties in an area for use in appraising similar properties. Eventually, this system will allow a year-by-year appraisal. County appraisals are now done every six or 10 years, Huffman said.

Records are not kept by Social Security number, since "in some counties this information is not available. Some counties don't have addresses of taxpayers," Huffman said, "they just come into the local office and pay.

"If this system can work in West Virginia, it should work anywhere," he added.

Each county arranges its data in a standard format, and eventually the property tax function will be interlinked with other government functions, he noted. For example, one might not be issued a driver's license until his property taxes were paid.

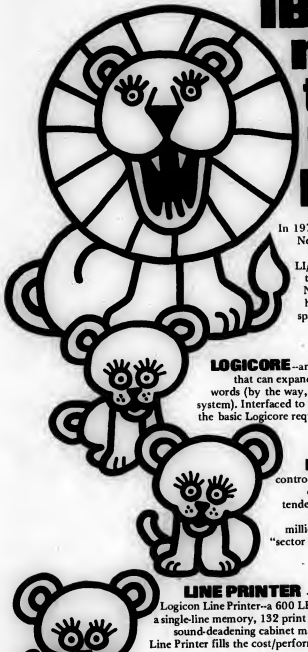
In West Virginia, the state sets all appraisal rates, but the county assessor can set rates at from 50% to 100% of the state value. With the system, the state has "full information on what transpires in each county and the ability to check on property appraisals, billings and collections," noted Cooke.

Market Conditions

By accumulating files of key property values by community, sales ratio analyses can be made on the basis of recent transfers. Current sales can then be used as a basis for adjusting appraisals to reflect the current market conditions in each community, he explained.

With tighter attention to appraisals, assuring uniformity and standardization, a system of reverting revenues back to the districts on an equitable per pupil basis will be much easier, noted Cooke.

A budget and appropriation accounting system, which will include a uniform statewide chart of accounts, is being planned, he added.



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Random Notes

Corporate Planning System Available on TSR Network

GREAT NECK, N.Y. – Businessman can evaluate alternative courses of action, or test the impact of changing conditions on thair firms on industry through the Corporate Planning System (CPS) recently made available on the Time Sharing Resources Inc. (TSR) network.

Working with ordinary English instructions, the CPS user can obtain pro forma profit and loss statements and balance sheets, operating ratios, discounted cash flow and other reports required for financial management and forecasting. TSR supplies In-Wats access to the computer center at 777 Northern Blvd., 11022.

ADR Revises 'Roscoe' Pricing

PRINCETON, N.J. – A revised pricing structure, effective May 15, for Roscoe, a keyboard remote job entry system, has been announced by Applied Data Research, Inc.

The system will be offered on a monthly basis for $1,000 or with a permanent license at a one-time charge of $18,000. Maintenance is included under the monthly plan and is optionally available after the first year to holders of permanent licenses.

Roscoe operates on IBM 360/40 and 370/145 and larger computers under OS, Hasp and ASP.

GE Nets Accept Third Code

BETHESDA, Md. – Computer terminals using "correspondence code" may now be used effectively on GE's 250-city international time-sharing network.

The new capability brings to three the number of terminal codes compatible with the GE system; Ascii, Ebcdic and Correspondence. It means users may select from virtually any 8-channel keyboard terminal available to access the network.

Cyphernetics Opens N.Y. Office

NEW YORK – The Cyphernetics Corp., a time-sharing firm with headquartars in Ann Arbor, Mich., has opened a manhattan branch office at 2 West 45th St.

In addition to general time-sharing capabilities, Cyphernetics provides applications services in statistics, text processing, computer graphics, information retrieval, management information systems and business and financial systems.

The network's headquarters are in Jackson Research Park, Ann Arbor, Mich., 48105.

Systems Unit Pays Off

L.A. Cuts SE Costs, Gains Uptime

By Don Leavitt
Of the CW Staff

LOS ANGELES – The Los Angeles County Data Processing Department has reduced the cost of systems engineering contracts by more than 60% compared to last year, and at the same time has substantially improved the uptime on its equipment, according to department director Gordon Milliman.

These changes were effected by the cooperation of most of the department's mainframe vendors, and the creation of an internal Software Services Division responsible for all systems software used by the department, Milliman said.

90% to 97% Uptime

Division chief Lance Goodwin noted that before his group had responsibility for the operating systems the average uptime was 50% to 60%. Now the average uptime for most systems in the department's six data centers is 90% to 97%, Goodwin said.

One system, in the engineering data center, has been up 97% of the time for three months in a row. The division's goal is to bring all systems to at least 95% uptime, he added.

The county has mainframes from several vendors and all but Burroughs were willing to supply operating system documentation. IBM even provided some of its material in microfiche, Goodwin said.

The division consists of three sections: one handles maintenance and modifications of the primary operating systems; another is responsible for special-purpose systems software, and the third provides consulting services to the programming and operations staffs and to users.

Extend Software

The operating services section has, in some cases, been able to extend the software provided by the vendor to do more than originally intended. In OS/360, for example, the section found that the I/O error queue was too short for the on-line volume the system had to support.

Before the section patched the IBM-provided coding, the system would go down any time the limit of the queue was exceeded. Now, the system can take almost any load, Goodwin said.

The cost of outside systems engineering contracts has dropped from $57,000 last year to $9,000 in a comparable period this year, Goodwin said, but noted there have been additional costs for education of the county staff.

'Tool Kit' Builds Cobol Code, Debugs and Documents Programs

PITTSBURGH – Cobol programmers who have been considering various programming aids may save themselves some time and management some money with the Tool Kit from Westinghouse Telecomputer Systems Corp. (WTSC).

The kit includes six separate, but complementary programming aids, priced at what WTSC claims to be less than one-third the cost of buying them individually.

Included are a short-hand translator and a decision table translator, a flowchart generator and a cross-reference processor, a library facility and a debugging package that references the user's source language paragraph names.

'Shorthand Translator'

The shorthand translator allows the user to specify his own abbreviations for data names, procedure names, clauses and literals. It produces fully expanded Cobol source coding.

Logic that can be stated in decision table form is expanded into full Cobol source code by the Tabtran package.

The flowchart generator provides documentation of finished programs.

The Tool Kit sells for $4,800 and is available now from 2040 Ardmore Blvd., 15221.

'Strobe' Pictures CPU, I/O Use

CAMBRIDGE, Mass. – Strobe, available now from Programart Corp., measures where and how time is actually spent by a production program on an IBM 360/370. It differs from other similar packages, however, in that it reports time usage in terms of the user's source procedure names, rather than specific core locations.

There are three components in the Strobe system which was developed by Computer System Architects Inc. The Bug occupies main storage concurrently with the program under test, is activated periodically by a timer interrupt and records the status of the subject program.

Indexer Maps Program

The Indexer is an optional component which, if used, maps the source program. It retrieves the programmer-assigned procedure names by scanning the output of an assembler or compiler run.

The Reporter correlates and interrupts the data prepared for it by the Bug and Indexer, and prints a program performance profile.

The Reporter is standard for all 360/370 configurations. A separate Indexer is required for each language processor and the Bug differs with each operating system. It is available for OS-MFT, OS-MVT and DOS users, the company said.

The system reports I/O utilization as well as time spent in program execution. The 10 least active memory areas are identified along with the 10 most active, so that "cold spots" of seldom-used code can be eliminated or overlaid.

The Strobe system can be purchased or leased from Programart at 133 Mt. Auburn St., 02138.

110K Bytes Needed for 'Adabas'

RESTON, Va. – Data base operations require as little as 110K bytes of storage and no reorganization of existing files, on IBM 360-370, RCA Spectra 70 "or most byte-oriented CPUs," with the Adabas software, available now in the U.S. from Software AG, North America.

Developed in Europe, the system is said to work in less core and to provide a number of features unavailable in other data base management packages. Information from several files can be coupled automatically, and the system can be run in on-line or batch mode, or in both modes concurrently, the company said.

Adabas also provides up to 199 check-points and a restart capability in case of hardware or software failure. A multilevel data security facility blocks unauthorized access to the user files, and an encoding capability makes any normal storage dump of the system unreadable, the firm said.

In common with other data base managers, this system allows redefinition, addition or alteration of data fields without any change in the user's application programs. The system supports random access retrievals and sequential processing

Demonstrations of Adabas with the user's data are available for $2,500, which can be applied to the $120,000 purchase price.

Software AG North America is at 12124 Bassett Lane, 22070.

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360 Users Gain TP Network Control Similar to 3705, With PHI Package

ARLINGTON, Mass. – PHI Computer Services, Inc. (PHI) has announced the 370¢ software system which permits OS/360 TCAM users to control a telecommunications network through a PDP-11 or Tempo-1 front-end processor.

The system is functionally equivalent to an IBM 3705 operating under the Network Control Program, but this configuration, as provided by IBM, cannot be supported by the existing 360 program product line, PHI said.

Three Modules

The package consists of three modules. A 360-resident TCAM Message Control Program allows the communications processor to operate on either the multiplexer or selector channel and provides high-level language interfaces to user programs written in Cobol, PL/1, and Fortran.

A Communications Processor Progam assumes network control and provides polling, message switching, error recovery, support of non-IBM-compatible terminals and software line switching. The Communications Program Generator permits the user to configure new Communications Processor Programs on the host 360 and load them directly over the channel into the communications processor.

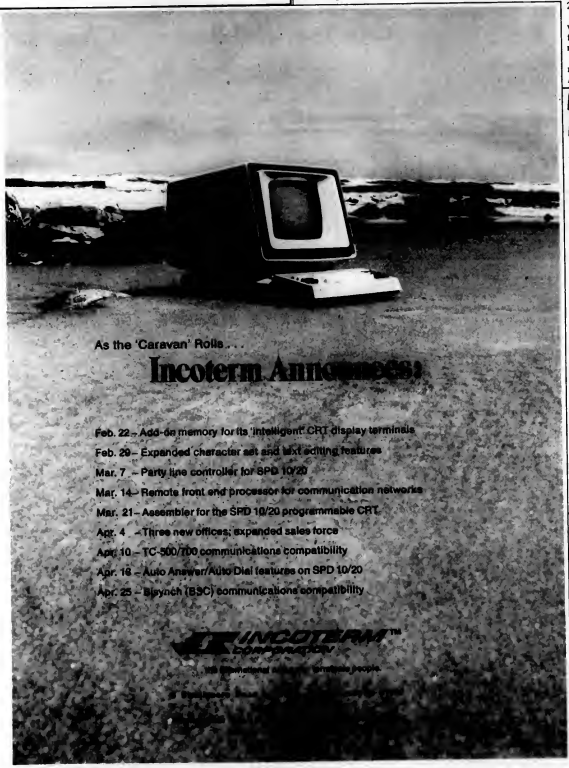
The software will interface to user programs employing TCAM as well as IMS and Hasp. Initially, terminal support will include teletypewriters and Ascii CRTs, binary synchronous devices and Terminal Control Type I devices (IBM 2741, 2740, 1050, etc.).

The user incorporates the PHI-provided Message Control Program into existing TCAM modules. Then, with the Communications Program Generator, he specifies the teleprocessing network using a macroprocessor and library provided by PHI.

The 370¢ software can be used concurrently with PHI's earlier Telecommunications Programming System (TPS) which allows the communications processor to emulate an IBM 2701, 2702 and 2703 Transmission Control Unit.

Delivery of the 370¢ software (with or without the PDP-11 or Tempo-1) ranges from 90-120 days, depending upon user requirements.

Cost of the system also varies with user needs, PHI said from 800 Massachusetts Ave., 02174.



Routine Allows RPG Runtime Interrupts

VALLEY STREAM, N.Y. – Processing in an RPG environment may be made more sensitive to conditions at execution time through the RPG Interrupt Routine from Computer Procedures Corp. (CPC). The subroutine lets the user interrupt the normal RPG cycle to retrieve a one-byte field from Syslog.

A message is printed to indicate the subroutine has been entered and "primed." The routine does not, however, become a fixed part of the RPG logic.

Instead, the routine is entered only when the interrupt button on the CPU console is depressed, halting the processing until the user enters a single byte of information, followed by end of block.

The keyed-in byte of data is stored in a field called "intbyt," available to the program for interrogation. Since RPG provides a broad range of test operations, the uses of this byte are "virtually unlimited," CPC said.

Different entries could cause different indicators to be set so that new streams of instructions are utilized. The byte might be used, for example, to bring a program to an orderly halt if it has to be interrupted before its normal completion.

The Interrupt Module, written in assembler and operational under DOS RPG costs $49.95.

CPC is at 181 South Franklin Ave., 11581.

Realtors Get Help

VAN NUYS, Calif. – Real estate companies can control accounting information, customer communications and management reports with the Land Investment Accounting System (Landcomp), available as a service bureau operation or a time-sharing application from Proprietary Computer Systems Inc. (PCS).

The time-shared version supports information retrieval as well as data entry and report generation on IBM Selectric-based terminals.

Report formats are customized and include daily or weekly transaction registers, delinquent notices and payment receipts. In addition to a normal range of periodic reports, Landcomp provides optional output such as microfiche of documents.

PCS is at 16625 Saticoy St., 91406.

The single way to store 100,000,000 bytes. The 7330 Disk Drive from ITEL.

Now there's a single-spindle storage subsystem for massive data bases up to 100 million bytes: the new ITEL 7330 Disk Drive. Using standard IBM 3336 disk packs, the ITEL 7330 increases storage capacity more than three times over previous models to 800 million bytes for an 8-drive subsystem. It's plug-to-plug compatible with IBM System/370. And it's quick on the draw: average access time is just 27 milliseconds.

The ITEL 7330 provides the high-capacity storage needed for management information systems, teleprocessing, multiprocessing and time-sharing systems. It offers a number of advantages over its IBM counterpart and other disk storage units. Each 7330 has a single spindle, so you can specify from 1 to 8 drives under one controller for maximum flexibility. The unit has a waist-high slide-back cover, for quick and easy disk change. All internal components are easily accessible. And its compact size means substantial savings in floor space. Reliability is insured through absolute air filtration, disk pack brushes, electromagnetic actuators and closed-loop optical servo positioning.

The ITEL 7330 is the latest in a line of advanced disk storage drives from the Information Storage Systems Division of ITEL. More than 3000 ISS disk drives are working today, proving themselves to be the industry standard for reliability.

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ITEL Corporation, DPC, One Embarcadero Center
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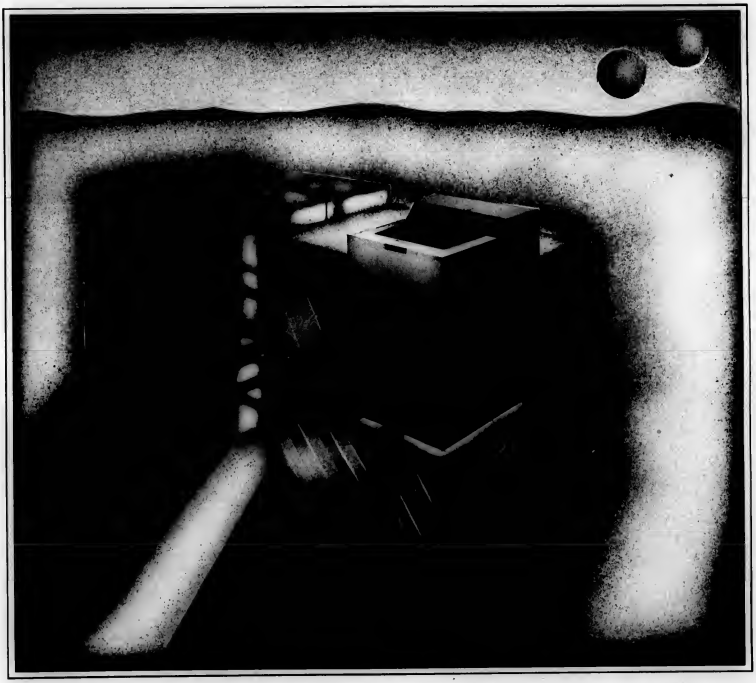

Photomecrography of the XCP core memory

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So, when someone from XLO Computer Products comes knocking on your door, rest assured that he's not representing just a couple of guys who tinker with computers in their basements on weekends. He's backed by a corporation that got where it is by making the right move at the right time. Many times.

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Users Trust TWX-to-CPU Input

By Ronald A. Frank
CW Staff

MAHWAH, N.J. – Some subscribers of Western Union's TWX service are using their teletypewriters for direct input to a CPU. Although this type of application is not economical in all cases, at least two large users receive remote input to their processors from directly connected TWX terminals.

At the Chrysler Corp. in Detroit, about 300 automative parts suppliers call in whenever they are preparing a shipment. Called the Dynamic Inventory Analysis System (Dias), the TWX-to-CPU configuration allows Chrysler to check supplier information against an on-line inventory stored in a 360/40.

Shipment 'Accepted'

Chrysler "accepts" the shipment via a return TWX message to the supplier only after the 360 has validated part numbers, plant destinations, size of order and other shipping data.

The TWX transmission to Chrysler is done on a line-by-line basis from paper tape, according to Wesley W. Hays of the Data Processing staff. At the end of each line an X-OFF character stops the transmission until it is checked by the CPU. After verification, the next line is sent.

Eight TWX subscribers can be handled simultaneously through an IBM 2702 front end. The TWX data is transmitted in 8-bit Ascii which is translated by the 2702 (using Btam) into Ebcdic, for entry into the 360, Hays said.

At Remote Computing Corp. in Los Angeles, subscribers can access the system using TWX terminals. About 20 terminals are now using the facilities. The user who is starting out in time-sharing can "try" the Remote Computing system via his TWX service without making a commitment to other equipment or lines, a spokesman said.

The company does not encourage continuous use of TWX for interactive time-sharing because the costs would be too high. But many Remote Computing users get Western Union's TWX Alternate Service which adds a data line to their teletypewriter for about $8.50/mo. With this feature, the user can switch between TWX and dial-up Data Phone service on the telephone network as his needs change.

Communications

Usually, messages of less than three minutes cost less on TWX, while longer transmissions are more economical on a dial-up data line, a Western Union spokesman said.

The Remote Computing system channels all subscriber calls through its Front End Device (Fred) communications system. Fred is implemented in an Interdata 4 minicomputer which connects the TWX and Data Phone systems with the firm's Burroughs B5700 CPUs.

Fred can accept input at speeds from 110 bit/sec up to 1,200 bit/sec, a Remote Computing spokesman said. The front end accepts Ebcdic, Ascii and Correspondence codes and performs any required translation for the data to be entered into the B5700.

For users who want to tie TWX terminals to their CPUs, Western Union provides two interface units. The 801 "permits a computer to automatically originate data calls to any subscriber in the TWX network," according to a Western Union manual. The 811 provides the two-way capability necessary to exchange serial code and control signals between the TWX terminal and the computer.

Additional information about the TWX alternate service or the TWX/CPU interfaces is available from Western Union, 82 McKee Drive, 07430.

CSMA to Honor Top Professional

WILMINGTON, Del. – The Communications Systems Management Association (CSMA) has established an annual program to select the "communications professional of the year."

The selection process will emphasize accomplishments and applications rather than "pure electronic aspects," according to a CSMA spokesman. A person responsible for a hardware development "leading to cost effectiveness for end users" could be considered as a candidate, the association said.

In addition to the yearly award, CSMA will give the recipient an honorary life membership in the organization. Those who receive the award will become members of a hall of fame, or academy of applied communications professionals, CSMA said.

The association will also establish financial assistance funds in honor of the recipients, to be contributed to the college or university that they select.

The first award will be announced at the CSMA fall convention to be held in Chicago later this year. A selection committee to screen nominees will be formed by Ralph Bergland, communications consultant. The final selection will be made by a "blue-ribbon panel" made up of management representatives from user firms, common carriers and regulatory bodies, CSMA said. The association is at 1102 West St., 19801.

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Bits and Pieces

Automatic Dialing/Answer Added to Incoterm Device

NATICK, Mass. – Incoterm Corp. has developed automatic answering and dialing features for the SPD 10/20 intelligent CRT terminal.

These enhancements are part of the SPD 10/20's asynchronous adapters which operate with asynchronous modems/calling units on the voice-band common carrier switched networks.

There is no extra charge for either the automatic dieling or answering feature when asynchronous modems and automatic dialing units are provided separately, Incoterm said.

First daliveries are scheduled for September from 8 Strathmore Road, 01760.

DEC Shows Mini-Based Systems

MAYNARD, Mass. – A computer-based pulse height analysis system, PHA-11, from Digital Equipment Corp., is designed for use in scientific research, environmental studies, nuclear-oriented control and non-destructive testing.

DEC also introduced e series of computer systems designed to provide low-cost, high-speed electrocardiographic analysis. The ECG-1500 computer series, priced as low as $85,000, puts computer-processed electrocardiography within the means of even small and medium-sized hospitels for the first time, DEC said.

Microfilm Cartridge Displayed

NEW YORK – Microfilm Products, Inc. introduced its Microcartridge which will operate in different microfilm readers, such as 3M, Microreaders, Dietzgen, Microscen, Ednelite end Northster. The Microcertridge holds e full length of 100 feet of 16 mm microfilm and protects film from dust and from scratching. The size is 4 in. by 4 in. by 1 in.

The firm is at 40 W. 15th St., 10011. 10011.

Unit Transfers Data to Cards

SANTA MONICA, Calif. – The Templapunch 512 from Source Information Systems is designed to accept date embossed and punched in a plastic pleta and transfer it to a punched card. Source Information Systems, Inc. is at P.O. Box 3088, 90403.

Smaller Bits

A high-capacity, perforated tape winder hes been introduced by Data-Link Corp., San Diego, Calif.

— — —

The TTS division of Remota Dete Terminals, Inc., Sarta Monice, Calif., has developed a modification kit offering ASR-33 Teletype users the ability to print 132 char./line on standard paper.

— — —

A coated disk certridge for use on IBM System 3 computers is being offered by Datapax Computar Systems Corp., Westwood, N.J.

— — —

A deta entry system thet uses an optical mark reader as a fiald terminal to translata pencil marks on a fanfold paper strip into computer-compatible code has been announced by the Automata Corp., Bellevue, Wash.

— — —

Dicom Industries, Sunnyvale, Calif., is offering a herdware/software interface of its Model 344 Cassette Magnetic tape system to the DEC PDP-11 minis.

Up to 28% Savings

Telex Memories Replace 3345, 3360

By Frank Piasta
Of the CW Staff

TULSA, Okla. – The 370/145 user could save 24% to 28% of his additional memory cost with a Telex solid state add-on memory in place of the IBM 3345 normally used to upgrade his system beyond 256K bytes [CW, March 29].

A second solid state Telex model is designed to replace all of the 3360 core memory used with the 370/155 and 165, at a savings of about 18%.

The Telex 6345 is intended as an exact replacement for the IBM 3345. The 370/145 mainframe has a capacity of 256K bytes and requires the addition of separate units of either 128K or 256K capacity, plus a power unit, when this limit is to be exceeded.

Upgrade CPU

The Telex units are used with the appropriate central processor; the user will have to upgrade his CPU to either HC or HI specifications in order to bring his system capacity to 384K, or 512K respectively for the 145.

The $324/mo cost of the power unit required with the 3345 represents another savings since the user of the Telex add-on does not need the device.

The 6345 is available in the 6345-1 model with a capacity of 128K and in the 256K 6345-2 model, corresponding to the two 3345 models. Rental price of the Telex Model 1 is $2,000/mo on a one-year lease, compared to $3,204/mo for the IBM 3360 Model 1 plus the 3406 power unit.

The 6345 Model 2 rents for $4,260/mo. The equivalent IBM 3345 Model 2 costs $5,584/mo including the power unit.

As with the 370/145, users of the 370/155 and 165 will have to upgrade their CPUs to make use of the Telex add-on. A significant difference is that the 145 requires a minimum of 256K bytes of IBM-supplied memory while the memories in the two larger models can be replaced entirely by the Telex units.

The Telex 6360 models 1, 2, 3, with capacities of 256K, 384K and 512K respectively, correspond to the 3360 models 1, 2 and 3 used with the 155. The 6360 models 4 and 5 are intended to replace the corresponding 3360 models on the 370/165, with capacities of 256K and 512K bytes respectively. All Telex units are field-upgradable.

The prices of the various models depend on the memory size, with the 256K models 1 and 4 priced at $2,500/mo, and the 512K models 3 and 5 at $5,000/mo. The IBM prices for similar units are $3,000 and $6,000/mo. The 384K Model 2 Telex memory costs $3,700/mo compared to $4,500/mo for the IBM unit, a savings of almost 18% to the user. All Telex prices are for a one-year lease.

Cycle times of the Telex memories were not disclosed, but the company claims they are more than fast enough to allow the respective processors to operate at their normal rates.

Since the Telex modules are 16% smaller than their IBM counterparts, according to Telex, there will be a reduction in floor space requirements.

The Telex memories offer off-line maintenance capability, in addition to error checking and correction functions which automatically correct all single-bit errors and detect all double-bit errors.

The incorporation of the off-line maintenance feature, Telex explained, permits the use of memory diagnostics without the employment of the CPU.

First deliveries will take place early in the first quarter of 1973.

Compact, Low-Cost Terminal Offers Alternative to CRT Use

DETROIT – A low-cost display terminal from Burroughs can replace CRT-equipped devices in many applications.

The TD 700 uses the company's Self-Scan panel as a display medium, eliminating about 90% of the electronic circuitry found in CRT units.

The Self-Scan panel is a gas discharge display in which inert gas is sandwiched between two plates of glass forming the display surface. Areas of the gas are ionized in a 5 by 7 dot matrix to produce characters that measure .28-in. high by .2-in. wide. The screen has a capacity of 8 lines of 32 red/orange characters against a black background. The display was previously used by Burroughs in its TC 1700.

The TD 700 can be used to communicate with most computers over switched or leased telephone lines, or over a direct line. It can handle synchronous communications at 4,800 bit/sec and direct connection. An optional switch allows the operator to select asynchronous line speeds of 150, 300, 600 or 1,200 bit/sec. Ascii coding is used.

A 256-character MOS memory serves as a line buffer and this can be expanded to 1K characters.

Burroughs TD 700 terminal uses novel display.

Multiple TD 700 terminals can share a single data set and communications lines. Any inoperative terminal in the linked together system can be bypassed, Burroughs said.

The keyboard is available in standard alphanumcric typewriter format, keypunch format and 10-key numeric format. The keyboard, display and control unit (which houses the logic for the display, as well as the memory, power supply and communications interface) can be separated by cables up to 6-ft. long.

This flexibility of installation together with a display panel size of 14.5 in. by 9.4 in. by 2.2 in. allows considerable latitude in component location, the company said.

The terminal is intended for such applications as inquiry and display of management information, on-line data entry, reservation inquiry in hotels and motels, order service departments and for on-line programming.

An optional feature of the TD 700, called Group Poll, eliminates individual polling of each terminal in a network of multiple TD 700s.

The TD 700 will be available for delivery by October 1972. Prices range from $3,325 to $4,490, lease prices from $85 to $115/mo. A non-keyboard model, without keyboard, will also be available at about $2,800.

Calcomp COM Unit Designed To Replace 1403 Printer on 370

ANAHEIM, Calif. – A COM unit which can replace the 1403 printer on-line or off-line with an IBM 360/370 has been developed by California Computer Products, Inc. (Calcomp).

The Calcomp 2100 is 10 to 15 times faster than the IBM printer and is software transparent, the firm said. It is available in versions that can use 16mm roll film, 105mm microfiche, or both.

On-line units operate at 12,000 to 15,000 line/min while off-line units approach 10,000 line/min, according to Calcomp, depending on the blocking factor and tape density.

Camera reduction ratios are 24X, 42X or 48X for both cameras. The 16mm camera accepts film in 500-ft or 1,000-ft rolls. The 105mm camera uses 200-ft rolls of 16mm or 105mm film, according to Calcomp.

Series 2100 systems can produce microfiche in Cosati, NMA, DOD or custom formats, selectable by push-button control. Page format is 132 char./lin, 66 line/page with forms overlay capability. A standard 64-character Ebcdic array, identical to the 1403 set, is used. A Katakana character set for printing Japanese is available.

Off-line units can be equipped with either 7- or 9-channel 800 bit/in. or 9-channel 1,600 bit/in. tape drives as input. The 2100 includes a single lens, with the second available as an option.

Base monthly lease price is $888/mo for unlimited usage including prime shift maintenance. The base sales price is $31,600, including maintenance for one year. Delivery is 90 days from 2411 W. LaPalma Ave., 92801.

CRT Unit Produces Full Color

EL MONTE, Calif. – An IBM-compatible CRT display from Aerojet-General Data Systems can produce full color, gray scale and color-coded images from digital input.

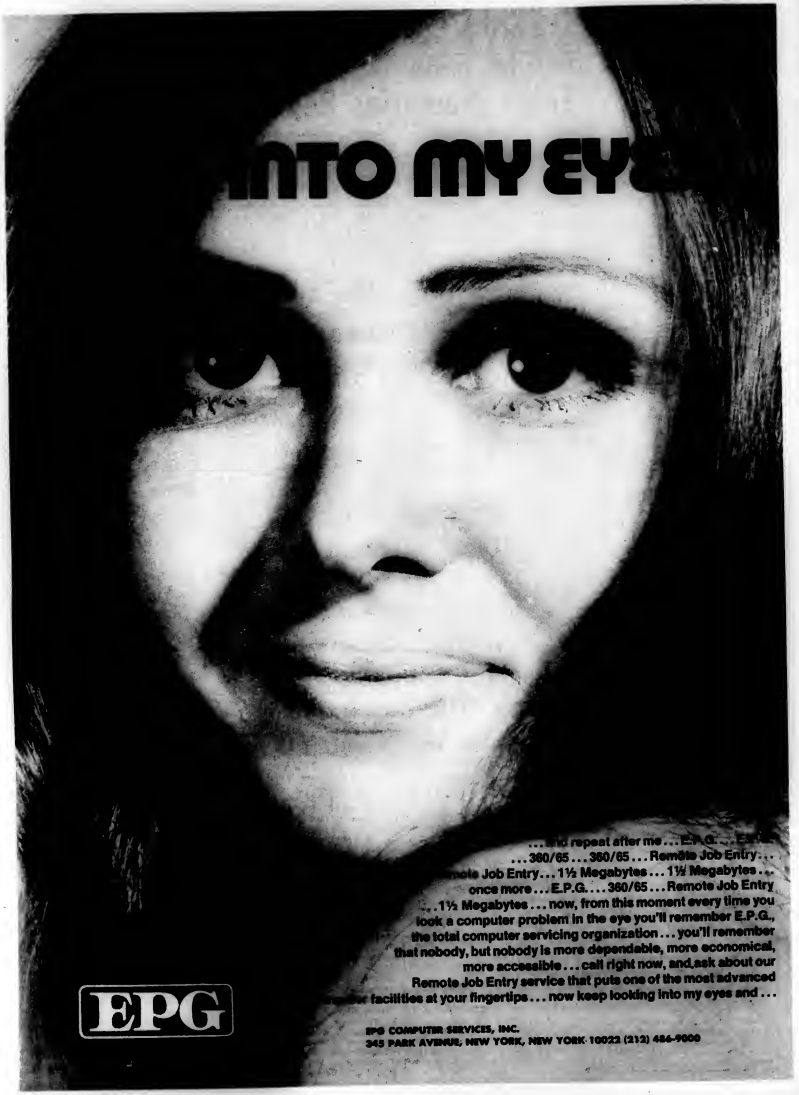
The Spectrovision SG-D2000 features a flicker-free screen display using color hue, saturation and luminescence for improved representation of three-dimensional subject matter, the company said.

The operator can assign and reassign color values and correct, compensate or rescale displayed values on all three axes of presentation.

The display uses a 525 line/frame, 30 frame/sec raster scan display standard. The display unit is a 19-in. tricolor TV monitor.

The display can produce the following patterns: white dots on a black background, electronically generated gray scale, black and white image of input data, color image of input data, or an electronically generated representation of the color values stored in the conversion section of the pseudo color units.

Prices of the Spectrovision displays range from $25,000 to $60,000. Deliveries are 60 to 120 days from 9200 E. Flair Drive, 91734.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System 3 Reader Handles Stub Cards

PHILADELPHIA – System 3 users will be able to read both 80-column and 96-column cards in both standard and stub formats and not lose the use of the Multi-Function Card Unit (MFCU) with a reader from Bridge Data Products, Inc.

Described as faster and cheaper than IBM readers, the 8803 is plug-to-plug compatible with the S/3. It can be attached to either the Model 6 or Model 10 through an input channel in the same way as the IBM 1442, allowing the independent operation of the MFCU and providing a third card input source.

The additional input capability allows the user to update a master card file on one pass and to convert 80-column card files to 96-column format at less cost than with the 1442.

The 8803 reads 80-column cards at up to 500 card/min, 20% faster than the 1442, according to Bridge. It can read 96-column cards at up to 750 card/min.

The reader can be adapted by the operator to read any of the four card formats in less than 30 seconds by changing the input hopper and output stacker. Two of the formats, the stub 50-column version of the 80-column card and the "topless" 96-column card introduced by Bridge (CW, Feb 23), cannot be read with normal S/3 peripherals, Bridge said.

Hopper and stacker capacity is 1,000 cards each. Cards are fed from the bottom of the hopper by a clutchless feeder mechanism with data read photoelectrically.

The 8803 weighs about 100 lbs and includes a table. The purchase price of $6,800 includes installation and two years of maintenance. Stub card reading options are $700 each. Lease price on a 36-month plan is $26/mo, with maintenance. The firm is at 738 S. 42nd St., 19104.

Logicon Has Add-On Core for 1130

TORRANCE, Calif. – Logicon, Inc.'s line of peripherals for the IBM 1130 is said to extend the life and improve the utility of the computer.

The products include Logicore add-on core memory and the Logicon Peripheral System (LPS) consisting of a disk drive and controller, SAC extender and a line printer and interface.

The Logicore memory uses 16 data bits and two parity bits. The cycle time of the memory is 750 nsec with an access time of 250 nsec, permitting the unit to be attached to any 1130, the company said. The memory interfaces with the computer through slip-on connectors attached to the pin side of the computer logic gates.

The prices of Logicore memories are: 8K, $11,500: 16K, $18,500; and 24K, $25,500. Lease prices are $345/mo, $505/mo and $660/mo respectively.

The LPS is built around the LPS disk storage system which consists of one or two 2314 type drives and controller.

The controller and first drive costs $23,750 and leases for $730/mo. The second drive sells for $15,250 and leases for $405/mo.

The controller can also connect the Logicon Line Printer to the 1130. Rated at 600 line/min, the unit can handle a print line up to 132 char. long. A single line buffer is included. The printer costs $19,200 and leases for $750/mo.

Initial deliveries originate from 21535 Hawthorne Blvd., 90503.

Remote Data Entry Handled by System

DAYTON, Ohio – Monarch Marking Systems, Inc. has an MDR-2100 System for source data recording and transmission that offers a combination of features for order entry and data reporting from multiple locations.

The MDR-2100 includes a remote data recording device for collecting numeric information, a transmitter which uses the recording unit to transmit the data collected via telephone circuits, and the receiver which records the data on magnetic tape.

The model 2104 portable data recorder has a solid-state memory with a capacity designed to suit the requirements of the application. It is powered by nickel cadmium batteries. Multiple units of the Model 2104 Data Recorder may be used.

Each of the transmitter models 2170, 2171 and 2172 uses a different form of interface including: phone systems, 202E7 or equivalent, built-in modem card for use with phone system, Data Access Arrangement and acoustically coupled systems.

The data receiver, Model 2190, is a magnetic tape data collection unit serving multiple transmission points. Standard densities are available including 1,600 bit/in. BCD, Ebcdic or Ascii codes are standard.

Prices start at less than $1,000 for the system.

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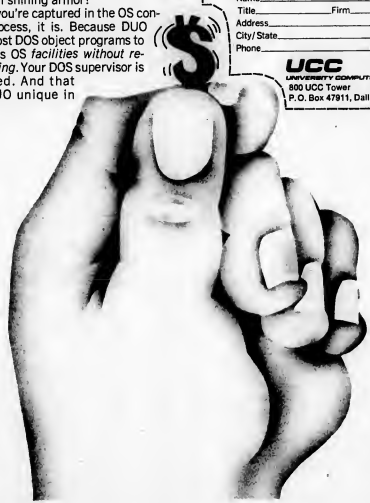

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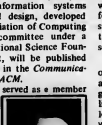
Course Report Reflects Social Concern

The new Master's Degree program in information systems analysis and design, developed by an Association of Computing Machinery committee under a $98,000 National Science Foundation grant, will be published next month in the *Communications of the ACM.*

The writer served as a member of this committee and as chairman of the subcommittee developing the undergraduate curriculum, to be released in September. This program is the business counterpart to Curriculum '68, the computer science curriculum which is a basis for most current university programs.



J. Daniel Couger On *Education*

The Information Systems Analysis Master's Degree report, divided into six categories, provides detailed course descriptions which training directors and academicians should find valuable, whether they adopt only one or all 13 of the suggested curricula.

Another part of the report attempts to define the knowledge and ebilities seen as necessary to work effectively in the field. The following abstract of the full list still gives a good indication of the committee's concern for the social impact of the computer.

- **People** – ability to hear others, as well as listen to them; ability to describe individual and group behavior and to predict likely alternative future behaviors in terms of commonly used variables of psychology and economics; ability to describe and predict task-oriented, time-constrained behavior in an organizational setting.
- **Models** – ability to formulate and solve simple models of the operations research type; ability to recognize in context the appropriate models for situations commonly encountered.
- **Systems** – ability to view, describe, define any situation as a system – specifying components, boundaries, etc.; ability to apply this "systems viewpoint" in depth to some class of organizations – manufacturing firms, government bureaus, universities, hospitals, service providers, etc.; ability to present in writing a summary of a project for management action (suitable to serve as a basis for decision); ability to present in writing a detailed description of part of a project for use in completing or maintaining same.
- **Computers** – knowledge of basic hardware/software components of computer systems, and their patterns of configuration; ability to program in a higher-level language; ability to program a defined problem involving data files and communications structures; ability to develop several logical structures for a specified problem; ability to develop several different implementations of a specified logical structure.
- **Organizations** – knowledge of the function of purposeful organizational structure, and of the major alternatives for that structure; knowledge of the functional areas of an organization – operations, finance, marketing, product specification and development; ability to identify in an ongoing organizational situation the key issues and problems of each functionel area; knowledge of typical roles and role behavior in each functional area.
- **Society** – ability to articulate and defend a personal position on some important issue of the impact of information technology and systems on society (important, as defined by congressionel interest, public press, semitechnical press, etc); ability to develop several positive and several negative impacts of a specified information system in a specified part of society; ability, given such specifications of impact, to perform a "roughcut" feasibility analysis of them in terms of behavioral and economic variables.

Couger is profesor of computer and management science at the University of Colorado.

Microfilm Meeting to Stress Education

NEW YORK – The primary emphesis of sessions at the National Microfilm Association's 21st annual convention Mey 9-12 will be on "education – education of the user of micrographics products, education of management-level people responsible for maintaining and moving data as quickly and efficiently as possible," noted program chairman Henry C. Frey.

The 18 seminars, four workshops and nine papers will cover everything from the basic elements to sophisticated computer output microfilm (COM) systems, he said.

A seminar entitled "Focus on the Future: Issues and Answers for the 70's" leads off the convention, with six panelists fielding questions pertaining to business, academic, scientific, automation, office systems and micropublishing applications.

Some of the discussions will focus on: new directions in the design and operation of technical information centers; online processing in a COM system; systems analysis for the '70s; data entry methods; COM, CIM interactive systems; COM: where it is going in the near future?, and real-time vs. on-time.

Friday workshops will cover storage and retrieval, scientific and engineering uses, office records and computer output/computer input microfilm.

Exhibits will be at the New York Coliseum, and seminars and workshops at the Americana Hotel. Registration information is available from the National Microfilm Association, 8728 Colesville Road, Silver Spring, Md. 20910.

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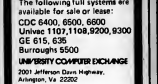
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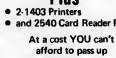

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computer industry

April 26, 1972 — a Computerworld news section about the nation's fastest growing industry

CI Notes

Japan Plans IC Link

Dempa Publications, Japan

TOKYO — Japan's first and fourth largest mainframe manufacturers, Nippon Electric Co. (NEC) and Toshibe, have revealed plans to develop integrated circuits which have a common configuration end can be used in computers manufactured by Honeywell Information Systems (HIS).

Both NEC end Toshibe are entering into technical tie-ups with HIS. The two companies are working out standardization of integrated circuits so that they can be applied to a new model which they themselves are developing and to a new series being developed by HIS.

Teletype Plans Buffer

SKOKIE, Ill. — Teletype Corp. may soon introduce a field-installable buffer on its Models 33 through 38 Teletypes. The new feature will allow the TTYs to transmit at speeds up to 1,200 word/min and will cost about $50/mo. The solid-state buffer will have a storage capacity of 2,000 to 4,000 characters.

Varian Mini Expected

IRVINE, Calif. — Varian Data Machine's announcement of its new computer that promises to be revolutionary in concept may still be two to three months away.

James Dobbie, vice-president, engineering, admitted the new machine would "eliminate the gap between minicomputers and large machines."

Supershorts

Cogar Corp. said last week it was out of money and looking for backers to keep it in business. Trading in the stock was suspended for 10 days after the announcement.

— — —

Data General has appointed Codevintec Pacific Inc., a Paris-based firm with offices in Moscow, as distributor for Data General products in the Soviet Union. The firm will also provide maintenance services in the country.

— — —

NCR will market Quantor Corp.'s computer output microfilm systems outside the U.S. As part of the agreement, NCR will have the right to establish a minority equity position in Quantor.

— — —

Sumitomo Shoji Kaisha, Ltd. and Peripherals General, Inc., (PGI) have reached agreement for Sumitomo to represent PGI in the Japanese computer markets. Sumitomo will also represent PGI in South Korea, Taiwan and Hong Kong.

Study for Nasa Shows

3 Mainframers Work on Mass Memories

By E. Drake Lundell Jr.
Of the CW Staff

GREENBELT, Md. — At least three mainframe manufacturers are working on prototype trillion-bit memory systems, according to a study prepared for the National Space Administration's (Nasa) Goddard Space Flight Center here.

The study, prepared by Informatics, gives technical details of an unannounced IBM system, Honeywell's Project Mass and Control Data's Scroller system as well as several announced trillion-bit memory systems from independent producers.

The study was undertaken because Nasa is considering the procurement of a system capable of handling 2 trillion bits of data as part of its Telops system. The system would have to have an error rate of better than one bit in 10 million bits.

The unannounced IBM system, described is thought by several industry sources to be the firm's long-rumored Commanche project.

According to the Informatics study, the system is organized in 9,600 cartridges with each cartridge containing 7 million characters.

Access time for a physical unit in the system is 5.4 to 7.4 seconds and the time to access a record is 30 msec track to track.

The unit uses a special head for recording and has 16 read/write heads, Informatics says.

The Control Data Scroller system uses 5,000-ft tape divided into 1,000 segments. Each segment has 2,046 tracks across the 22-in. wide tape and each track within the segment can hold 240,000 bits for a total capacity of a trillion bits in a two-tape system, according to Informatics.

Access time for a physical unit is .5 sec and for a record it is 33 msec/revolution with five revolutions maximum.

The Honeywell Project Mass uses a thin metal film on a thick glass substrate and an electron beam to irreversibly alter the film.

Each module in the system has 50,000 pages and each page contains 4,500 lines each with 4,500 bits for a total of 1 trillion bit/module.

Times to access a physical unit is 100 msec average to move table and 10 msec to 30 msec for serial block to block; 140 msec is said to be the worst access time. Access time for a record is 100 μsec to a line.

The type of minicomputer to be used in the system has not yet been selected, although Informatics says Honeywell is using a Varian system in the laboratory version.

Honeywell and Control Data sources admitted they were working on projects described in the report, but IBM said "it is not our practice to comment on speculation." The sources indicated, however, that some of the specifications in the report had become outdated by more recent developments.

Informatics notes the characteristics of the systems outlined in its study were "derived from the materials provided by the manufacturers."

'Carefully Evaluated'

"It is very important that this data," it warns, however, "be carefully weighed and evaluated in terms of credibility. Only four firms have a product that even approaches operational status . . . while most of the others are still in the prototype model stage where they can demonstrate the engineering principles. A few firms have produced storage modules that utilize the same principles for their trillion-bit systems, but not quite the same way as needed.

"For example, one firm has recorded 14 tracks across a tape, but 28 tracks will be needed for the trillion-bit system, and this has not been tried."

The study warns the government that "not only must the characteristics be carefully evaluated, but the price, systems availability data and data access parameters must be considered as very tentative and overoptimistic.

"The study team notes the many delays in delivery dates, the many escalations in purchase price and the several redefinitions in access parameters that have occurred in the past two years for the two leaders.

"It predicts the same phenomenon will be observed for those systems still two years away."

Japan's DP Growth Slows, Standards Pact Possible

Dempa Publications, Japan

TOKYO — Sales of domestically manufactured computers, which have shown a sharp upward curve in recent years, slowed down substantially in 1971, a reflection of the protracted business recession in Japan.

Two Japanese manufacturers, in their search for wider markets, plan to propose standardization of basic specifications for new computers to two European firms.

The total sales by six leading computer hardware manufacturers for fiscal 1971 ending March 31 showed a mere 8% increase over the previous year. Even the top gainer had only a 15% increase.

Fujitsu recorded about $236.4 million in sales (excluding sales of numerical control and DP systems), which represents a 3% to 14% increase over the previous year. Hitachi's sales totaled $230.4 million, a 10% increase. Toshiba and Oki Electric Industry registered increases between 11% and 15% in sales of mainframes and computer-related equipment. Of the total sales of $95 million recorded by Oki Electric, the computer division accounted for only about $27.8 million, a decline of 6.5% from last year's figure of $29.8 million.

Sales of Nippon Electronic and Mitsubishi Electric leveled off at about $208 million and $32 million, respectively.

Industry sources estimate that the total sales in 1972 of the six computer manufacturers will reflect an 8% increase.

Sales in 1971 by the Japan Electronic Computer Co., which was established jointly by seven domestic DP makers and handles some 40% of the total sales of domestic general-purpose computers, are estimated somewhere around the last year's $294.4 million.

Since this company had been maintaining a healthy annual growth rate of 50% over the past several years, the Japanese computer hardware industry now faces a very serious situation.

Hitachi, Toshiba and Mitsubishi all foresee a further decline in the growth of sales, and Fujitsu and Nippon Electric anticipate an 8% to 10% increase. The only exception to these gloomy estimates is Oki Electric Industry's prediction that sales will increase by 26% or more.

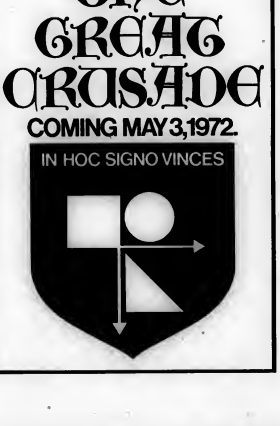
Under the circumstances, all the manufacturers are trying to stimulate demands and encourage the use of computers.

The fact remains, however, that conditions do not seem right for a widespread increase in computer installation in the near future, and it is difficult to predict when the national economy will pick up.

The plan by Fujitsu and Hitachi to propose standardization with Siemens Co., Ltd. and Compagnie Internationale pour l'Informatique (CIT) of France may be a first step toward a Japanese-European alliance computer to cope with IBM.

Fujitsu and Hitachi are drawing a plan to cover a three-stage program for the standardization of basic specifications:

- To develop software by taking shares in the field, and to interchange software by sale between parties.
- To control and allocate the production of input/output equipment.
- To achieve unified control over mainframes and completed assemblies.



Cambridge Memories' Plug-Expandable Core Offers up to 20-bit Word Lengths

NEWTON, Mass. – A plug-expandable core memory system with word lengths up to 20 bits and vertical packaging techniques has been introduced by Cambridge Memories, Inc.

Super Expandacore systems can be expanded from 8K words in pluggable 8K modules to 72K words.

Both control and storage cards are stacked vertically in the Vertacage mounting unit. The two features enable memory designers to add greater programming flexibility and more compact memory packaging to the systems, the company explained.

The Verticage design reduces the size of a memory by as much as 20%, while providing automatic convection cooling capabilities, the firm said.

The two-card organization of the memory permits interchangeability of control cards as well as storage cards, according to the company, and provides for simplified memory field expansion. A single control card controls up to nine 8K storage cards. Memory stacks are planar and use lithium cores with a cycle time of 850 nsec.

A basic configuration of the Super Expandacore is priced at $1,600 for small OEM quantities. Deliveries are 30 days from 285 Newtonville Ave., 02160.

Card Reader Costs $1,500

NEW YORK – Panasonic's new Optical Static Card Reader reads a standard 80-col card in a static (stationary) condition.

The Model ZU960HC-31L is composed of a light sensor matrix (12 by 80), a card slot and light sources. Cards are inserted into the slot, manually, one card at a time, and are popped up.

Matrix sensors are isloated from each other by built-in diodes. When scanned, the reader yields output voltage which is interfaced to TTL through a buffer. The output can either be parallel or serial, depending on the scan method.

Prices for the 11 in. by 5 in. by 3 in. unit start at $1,500 for a single unit, with delivery of about five weeks from 200 Park Ave., 10017.

Other New Products

The new Alpha Data Series 16 head/track disk memories from Alpha Data, Inc., Canoga Park, Calif., are designed to store from 4 Mbit to over 20 Mbit. All models feature Alpha Data's patented head-lifting mechanism, and self-locking electronics.

– – –

Up to six captions can be evenly and individually illuminated with a status display module from Dialight Corp., Brooklyn, N.Y. Separate light-emitting diodes are individually controlled to light up each caption.

– – –

Macrodata Co.'s new MD-73 Programmable Clock Generator is an independent module for IC test systems. The unit has a basic

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rate of up to 6.7 MHz, with a rate resolution of 10 nsec and a pulse position resolution of 1 nsec, thus allowing the user to move each clock edge in 1 nsec increments. Pricesstart at $9,880, and delivery is within 30 days from Chatsworth, Calif.

– – –

Litton ABS OEM Products Division, Carlstadt, N.J., is offering a paper tape rewinder, the OEM 92A, a self-contained mechanism which can be purchased with or without the free-standing base plate for permanent mounting on user's equipment. It is compatible with Ansi standard tape reels.

– – –

Development of a 16-bit MOS/LSI photodiode shift register that operates a wide range of high and low levels of incident light and provides a digital output was announced by North American Rockwell Microelectonics Co. (NRMEC), Anaheim, Calif.

– – –

Mechanical Enterprises, Inc., Alexandria, Va., has 10 types of basic alphanumeric keyboard arrays (in both the Type 33 Teletype and Ascii) and over 100 different combinations of satellite key clusters.

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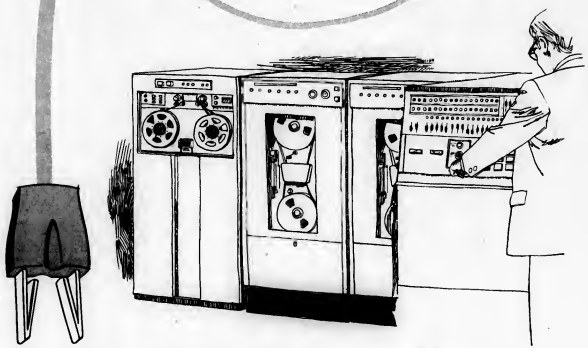

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Leasing & Industrial Loans

GSA Standardizes Jobs, Rates

Ordering Agreement Heats Up Software Competition

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. – Software firms doing business with the government are finding a different situation since Region 3 of the General Services Administration developed a Basic Ordering Agreement (BOA) which standardizes job descriptions and rates of payment.

Firms signing the BOA have to prove to the government they have people capable of operating in the skill areas outlined in the contract (CW, April 19) and quote a set hourly price for those services.

In-House Capability?

When a government agency needs software services, the government first checks to see whether it has the capability in-house. If it does not, Region 3 can recommend that the agency contract with one of the firms that has signed the BOA.

To date, the BOA is being used as a test in the Washington, D.C., area, but most software firms interested in government business are headquartered or have offices in this area, according to T. Fred Noble, chief of the Federal ADP Resources staff of the Automated Data Management Division in Region 3.

In addition, most standards for business conduct development in Region 3 eventually are spread to other regions of GSA, he said.

The actual contracting under the BOA is conducted by the using agency. It can choose several firms from the list to ask for bids on the project.

Because every firm has spelled out the hourly rates for the various services covered, the contracting officer has a pretty good idea of what the contract should cost.

Sometimes the firm with the higher hourly rate, however, will end up being less expensive on a contract because it is able to complete the job faster than its competition, GSA said.

'Fastastic' Advantages

The advantages to the government are fantastic, according to Noble. Use of the BOA has cut down the lead time to award software contracts by as much as 70%, he claimed, and the published list of prices has caused several software firms to reduce their rates on government work.

In addition, the BOA has given the GSA a feel for the normal or average prices for different services and the group has refused to list firms that charge too high a fee for the service offered.

Before listing a firm, GSA also checks on the company's financial responsiblity to make sure it can complete work under a BOA.

The use of firms on the BOA is not mandatory for government agencies at present but may be made so at a later date, Noble indicated.

"We would rather have them accept and use the BOA because they like it and can see its benefits," he said, "and not force them to use it."

Firms listed on the BOA have to offer the same rate on every contract, which prevents "buying in." For example, if a firm offers a government agency a particularly low rate for services in order to get a contract, then it will have to offer the same rate for the same service to all other government agencies.

But still the rates vary widely. For example, among the first 30 firms signing the contract (there are 50 firms on it now) the rates for a systems analyst varied from around $12/hr to $22/hr.

The government also has a BOA for keypunch services under which a firm must spell out the hourly rates it will charge the government for such services.

In the future, the GSA plans to develop a BOA for key-to-tape/disk services, and GSA officials said they might develop such a document for maintenance services.

"This has really increased competition among the software suppliers here," one software man said.

"With all of the prices spelled out, the firm with the best salesman won't necessarily get some of these contracts. They have the highest overhead usually and therefore their hourly rates will probably be higher.

"But the small outfit that is lean and hungry can offer to perform the same services at a lower rate because of low overhead."

The BOA will "definitely increase competition," another vendor said, admitting "We've even thought of reducing our rates some to stay more competitive with some of the other firms on the list."

Contracts

GTE Information Systems Inc. has been awarded a $4 million contract for computer and communications equipment and programming for the nationwide Block Automation System (BAS) of the New York Stock Exchange.

Programming Methods, Inc. will provide software, Tempo Computers Inc. will manufaeture the four communications control computers and Ultronic Systems Corp. will produce the 350 printers and 300 video display terminals. All three companies are operating units of GTE information Systems.

The Univac Division of Sperry Rand Corp. has received a multi-year subcontract with a potential value of $39.3 million from Litton Industries.

Under the subcontract Univac will produce basic shipset computer systems for the Navy's new Spruance-class destroyers.

Montgomery Ward has ordered 3,500 NCR 280 terminals, as the second phase of its three-year program to install point-of-sale terminals In retail stores throughout the country. Ward's investment in this total program is estimated at about $20 million.

Syncom Inc.'s Shieldata Division has won a contract to supply the state of Pennsylvania with magnetic tape over the next year.

The Memory Products Div. of Fabri-Tek Inc. has received an order to produce additional core memory stacks for the Varian Data 620/f. The order, valued in excess of $100,000, is an additional release against a master contract on the order of $750,000.

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U.S. DP Exports Decline in February, Western Europe Still Largest Market

WASHINGTON, D.C. – U.S. manufacturers exported computer equipment valued at $91.4 million in February, down slightly from the $92.9 million in exports in January, according to the Bureau of Census here.

Western Europe continued to be the largest market for U.S.-made equipment receiving computers and peripherals valued at $101.4 million out of the total exports of $184.3 million in the two-month period.

Of this, members of the European Economic Community received imports valued at $65.6 million, the UK accounted for imports valued at $15.6 million and the other members of the European Free Trade Association received equipment valued at $15.9 million.

Canada Market

Canada was the second largest market with imports of $28.7 million, while Japan followed with imports valued at $22.3 million. Next in line was Latin America, which received equipment valued at $10.8 million, followed by Asian countries with $9.1 million and Australia and New Zealand with imports from the U.S. valued at $8.4 million.

Meanwhile, U.S. imports of computers dropped to $60.4 million in February from the $64.3 million registered a month earlier, for a total of $124.8 million for the year.

Western Europe was the largest single source for the imports, shipping equipment worth $51 million to the U.S. in the two-month span. Of this, $32 million came from members of the European Economic Community and $7.3 million came from the UK, while $10.7 million in equipment was shipped from the other members of the European Free Trade Association.

Canada was the second largest source of imports, shipping equipment valued at $35.9 million and Japan was in third spot with exports to the U.S. valued at $27 million, the Bureau of the Census said.

The U.S. also imported equipment valued at $5.3 million from the members of the Latin American Free Trade Association and $5 million worth of equipment from Asian countries, outside of Japan.

Orders & Installations

Power companies in Portugal and West Germany have ordered Univac systems. The Berlin Power and Light Co. will use an 1108 for customer's bills, load distribution and power engineering calculations. The Companhia Portuguesa de Electricidade will use an 1106 for scientific work and establishment of an MIS system. Eventually the system will be used to monitor the nationwide power network.

Ciments LaFarge, a French cement producer, has ordered a Univac 1106 and two 9300s and peripherals and terminals. The system will handle general business work as well as data bank and scientific tasks.

A Finnish data center formed to serve the dairy and farming industries, Tietolaari OY, has ordered a Honeywell 6040, which will also be used by two parent companies.

A Mexican development agency, Comision del Grijalva, has ordered a Control Data 3400 for business applications, flood control calculations and other technical applications.

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Depreciation Figures in DPF Loss

HARTSDALE, N.Y. – After accelerating its rate of depreciation, DPF Inc. is taking e $35.1 million loss for the nine months ended Feb. 29.

A $42.8 million special depreciation charge, less e deferred income tax credit of $7.6 million, resulted in the loss for DPF, formerly Data Processing Financial & General Corp. Earnings for the year ago period were $3.9 million, or 96 cents e share.

Revenues were just under $33 million this year, compared with last year's $36.2 million.

After applying the special charge to the nine months, the depreciated book value of DPF's computer portfolio as of last June 1, the beginning of the fiscal year, was $127.3 million, DPF said. The charge was made to "reflect current conditions in the computer leasing field" and to put the book value of the IBM computers, primarily 360s, "into balance with projected net rental revenues during the remaining estimated useful life of the equipment," according to the firm.

DPF plans to fully depreciate by class of equipment the revised book value over its estimated remaining life to dates no later than May 31, 1979.

The decline in nine-month revenues wes attributed to "continued rete erosion" and an increase in equipment returned. Remarketing costs were significantly higher than e year before, the company said.

NCR Reports Loss

3 Major Makers Show Upswing

Quarterly reports from IBM, Burroughs and Honeywell appear to indicate a receding recession.

All three posted higher earnings and revenues than in the 1971 first period. But NCR, citing adverse effects of a strike and a sharp drop in sales in the UK, posted a loss of $6.8 million.

With considerable help from outright sales of 370s, IBM's earnings for the quarter ended March 31 rose 21.9%, to $305.7 million, or $2.64 a share, compared with $250.8 million, or $2.19 a share in the same 1971 quarter.

Revenues Soar

Revenues soared 23.6% to $2.31 billion compared with $1.87 billion in the year earlier period. "The proportion of equipment purchased outright was considerably higher than the depressed level of the first quarter of 1971 and contributed significantly to the increase of 23.6% in gross income over that period," commented Chairman T. Vincent Learson.

But "while moderating slightly, the high level of discontinuances of leased date processing equipment experienced last year continued, and rental and service gross income increased 9% compared to 15.9% for the first quarter of 1971," he noted.

At Burroughs, however, rental and service revenue increased 17% during the quarter, helping the firm post record earnings and revenues for the period.

Earnings for the three months rose 11%, to $12.2 million, or 66 cents a share, compared with $11 million or 60 cents a share in the 1971 period.

Revenues rose 6% to $220.6 million, up from $208.1 million in the year-ago quarter.

The DP products sector scored "significant increases" in incoming orders, noted President Ray W. Macdonald.

Honeywell Figures

At Honeywell, a 14% rise in computer revenues for the quarter helped boost earnings 60% to $11.2 million, or 60 cents a share, compared with the year earlier $7 million, or 40 cents a share. Sales for the three months posted a 5% gain, totaling $450.2 million, up from $430.4 million.

NCR's $6.8 million loss, equivalent to 31 cents a share, compares with earnings of $4.4 million, or 25 cents a share, in the year-ago period. Revenues declined to $326.8 million from $343.6 million.

NCR estimated the effect of a strike cost about $5 million, after taxes, in first quarter earnings. The firm also cited a $6 million decline in earnings of its UK subsidiary, where demand for business equipment declined sharply following heavy replacements during the decimalization program.

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Data 100 Shows Loss; Accounting Changed

MINNEAPOLIS – Data 100 showed a $4.4 million loss, or $3.72 a share, for the year ended Dec. 31, thanks to an accounting change.

A change in accounting for sales to third-party leasing companies dropped revenues from $14.5 million to $3.9 million under the operating method. This compares with 1970's restated revenues of $1.5 million.

Operations of Compat Corp. were included since its acquisition on Dec. 3. Shipments in the second half of the year were double those of the first half, according to President Edward D. Orenstein.

Better days on the books are ahead, however. With the change in accounting, by which revenues and certain costs associated with such sales are spread over five to seven years, Date 100 reported an increase in income deferrals of $10.7 million in 1971.

New Registrations

INTEL CORP., 3065 Bowers Ave., Santa Clara, Calif., semiconductor memory manufacturer, filed to register 37,981 shares of common, to be offered for sale at $22.63 per share maximum.

DATA RECALL CORP., 142 Oregon St., El Segundo, Calif., add-on memories manufacturer, filed to register 400,000 shares of common. Proceeds, at $15 per share maximum, to be used to retire short-term loans and for working capital. The underwriter is Oppenheimer & Co., One New York Plaza, New York, N.Y. 10004.

VARISYSTEMS CORP., 80 Skyline Drive, Plainview, N.Y., minicomputer systems manufacturer, filed to register 200,000 shares of common. Proceeds, at $15 per share maximum, to be used for product engineering and development and for working capital. The underwriter is First Equity Corp. of Florida, 100 W. Kennedy Blvd., Tampa, Fla. 33602.

TRADE*QUOTES

Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass 02138

CLOSING PRICES THURSDAY, APRIL 20, 1972

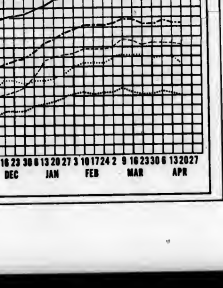
E X C H		1972 RANGE (1)	CLOSE APR 20 1972	NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCEO COMP TECH	1- 2	1 1/4	- 3/8	-23.0
A	APPLIED DATA RES.	5- 7	5 3/8	0	0.0
A	APPLIED LOGIC	1- 4	2	0	0.0
N	AUTOMATIC DATA PROC	72- 91	86 1/4	- 5 3/8	-4.0
O	AUTO SCIENCES	1- 1	1/4	- 1/8	-33.3
O	COMPUTER DIMENSIONS	0- 14	8	+ 1/2	+5.8
O	COMPUTER NETWORK	4- 7	4 5/8	+ 1/4	+5.7
N	COMPUTER SCIENCES	8- 10	9 1/8	- 1/2	-5.1
O	COMPUTER TECHNOLOGY	6- 8	8 1/2	-1 1/8	-14.7
O	COMPUTER USAGE	9- 14	13	- 3/4	-5.4
O	COMP AUTOMOT REPORTS	7- 9	9	- 1/2	-7.8
N	COMPUTING & SOFTWARE	22- 28	24 7/8	- 7/8	-3.3
O	COMRESS	1- 3	1 3/4	- 1/4	-5.3
O	CONSHARE	5- 10	8 1/4	-1 1/4	-12.9
O	DATA AUTOMATION	1- 1	1/4	0	0.0
O	DATAMATION SERVICE	1- 1	3/8	0	0.0
O	DATATAB	5- 9	7 3/8	+ 1/8	+1.7
O	EDP RESOURCES	4- 8	6	+1 1/2	+33.3
A	ELECT COMP PROG	1- 3	1 1/2	- 1/2	-25.0
N	ELECTRONIC DATA SYS.	43- 63	61	- 3/8	-0.6
O	INFORMATICS	8- 11	8 3/4	- 3/8	-4.1
O	I.O.A. DATA CORP	1- 2	2 1/4	+ 1/8	+5.8
A	ITEL	10- 12	11 5/8	- 1/8	-1.1
O	KEANE ASSOCIATES	4- 7	5 1/2	+ 3/4	+15.7
O	KEYSTONE CORP	7- 10	8 7/8	0	0.0
A	LOGICON	4- 9	7 5/8	- 1/4	-3.1
A	MANAGEMENT DATA	6- 10	8 5/8	+ 3/4	+9.5
O	NATIONAL CSS INC	8- 17	16 3/4	+1	+6.3
O	NAT COMP ANALYSTS	1- 1	7/8	0	0.0
P	ON LINE SYSTEMS INC	8- 15	12 3/4	- 1/4	-1.9
N	PLANNING RESEARCH	11- 17	13 1/2		-2.0
O	PROGRAMMING METHODS	22- 24	22 1/4	+ 1/4	+1.1
O	PROGRAMMING & SYS	1- 2	1 1/2	- 1/4	-7.6
O	SCIENTIFIC COMPUTERS	3- 4	3	0	0.0
O	SIMPLICITY COMPUTER	1- 5	4 1/4	+ 3/8	+9.6
O	SOFTWARE SYSTEMS	1- 3	1 3/8	0	0.0
O	TBS COMPUTER CENTERS	1- 5	1 1/4	0	0.0
O	TRACOR COMPUTING	2- 5	1 7/8	+ 1/4	+15.3
O	TYMSHARE INC	5- 10	8 1/2	+ 1/4	+3.0
N	UNITED DATA CENTER	5- 8	7 1/2	+ 1/4	+3.4
N	UNIVERSITY COMPUTING	18- 28	24 3/4	+ 1/2	+2.0
A	URS SYSTEMS	6- 9	8 5/8	0	0.0
O	VORTEX CORP	4- 5	2 1/2	- 1/2	-18.6
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	3¾- 42	36 3/4	-1 5/8	-4.2
O	ALPHANUMERIC	1- 2	5/8	- 1/8	-18.6
N	AMPEX CORP	8- 13	8 1/2	- 5/8	-4.2
O	ANDERSON JACOBSON	5- 8	5 1/2	- 1/4	-4.3
O	ATLANTIC TECHNOLOGY	3- 11	7	- 3/4	-8.6
A	BOLT,BERANEK & NEW	5- 18	10 1/2	- 1/4	-2.3
N	GUNKER-RAMO	9- 14	13 1/4	+1 3/8	+11.5
A	CALCOMP	19- 25	20 3/4	- 7/8	-4.0
O	CENTRONICS DATA COMP	11- 38	39	+6 1/2	+19.0
O	CONSTRONICS	3- 5	2 3/4	- 1/8	-4.3
O	COMPUTER COMMUN.	3- 7	4 1/4	+ 1/2	+13.3
A	COMPUTER EQUIPMENT	3- 8	3 7/8	0	0.0
O	COMPUTER MACHINERY	7- 11	11	+ 7/8	+8.6
A	COMPUTEST	6- 9	5 7/8	+ 1/2	+7.8
O	CONSOL COMPUTER LTD.	1- 1	1/2	0	0.0
A	DATA PRODUCTS CORP	5- 7	6 1/4	+ 7/8	+16.2
O	DATA RECOGNITION	4- 5	4	+ 1/4	+6.6
O	DATA TECHNOLOGY	5- 8	6 1/4	- 1/8	-3.7
O	OI/AN CONTROLS	0- 8	6 1/2	- 3/4	-10.5
O	OGITRONICS	3- 4	3 7/8	-	0.0
N	ELECTRONIC M & M	6- 8	6 1/4	- 1/2	-7.4
O	FABRI-TEK	2- 5	4 7/8	+ 1/8	+2.6
O	GENERAL COMPUTER SYS	7- 16	12 3/4	+ 1/4	+2.0
N	GENERAL ELECTRIC	59- 70	67 5/8	-1 7/8	-2.6
N	HAZELTINE CORP	9- 13	11	- 5/8	-5.3
O	INFOREX INC	7- 44	40 1/2	-6	-12.9
O	INFORMATION DISPLAYS	3- 5	3 1/8	+ 3/8	+15.0
O	MANAGEMENT ASSIST	1- 3	1	- 1/8	-20.0
N	MEMOREX	27- 38	32 5/8	+2	+8.5
A	MILGO ELECTRONICS	17- 30	27 3/8	+ 3/8	+1.9
N	MOHAWK DATA SCI	20- 27	27 1/8	+1 3/8	+5.3
O	OPTICAL SCANNING	7- 14	10 1/2	+ 1/4	+2.5
O	PERTEC CORP	12- 17	13 1/2	+ 1/8	+0.9
O	PHOTRON	7- 10	7 1/2	- 1/2	-6.5
A	POTTER INSTRUMENT	15- 1	17 3/8	- 7/8	-4.7
O	PRECISION INST.	7- 12	8 1/2	+1 1/4	+17.2
O	RECOGNITION EQUIP	10- 18	10 1/8	- 1/4	-2.4
N	SANDERS ASSOCIATES	16- 21	17 5/8	-1 1/4	-6.6
O	SCAN DATA	9- 13	10 1/2	+1	+10.5
O	STORAGE TECHNOLOGY	17- 27	27 1/2		+1.7
O	SYCOR INC	7- 10	7	- 3/4	-9.6
O	TALLY CORP.	8- 13	9 1/4	- 1/2	-5.1
N	TEKTRONIX INC	3¾- 50	47 1/2	+ 1/4	+0.5
N	TELEX	11- 15	11	- 1/2	-4.3
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	8- 9	8 1/2	+1 1/2	+21.4
A	BARRY WRIGHT	9- 13	11 1/2	-1 1/8	-8.9
A	DATA DOCUMENTS	17- 26	25 1/8	+2 1/8	+9.2
O	DUPLEX PRODUCTS INC	12- 15	13 1/4	- 1/4	-1.8
N	ENNIS BUS. FORMS	7- 9	8 5/8	- 1/4	-2.8
O	GRAHAM MAGNETICS	15- 27	22 1/8	+ 3/8	+1.7
O	GRAPHIC CONTROLS	12- 15	14 1/2	+ 1/4	+1.7
N	3M COMPANY	129¾-149	143	- 5	-3.3
O	MOORE BUS. FORMS	42- 48	47 3/8	- 1/8	-0.2
N	NASHUA CORP	4⅜- 5⅝	5¼ 1/8	+ 1/8	+0.2
O	REYNOLDS & REYNOLD	32- 77	40 1/4	- 2 3/4	-6.3
O	STANDARD REGISTER	16- 20	18 1/8	- 5/8	-3.3
O	TAB PRODUCTS CO	14- 17	16 3/4	+1 1/4	+8.0
N	UARCO	23- 28	24 1/2	+ 1/4	+1.0
A	WAGASH MAGNETICS	8- 11	10 1/2	- 1/2	-4.5
N	WALLACE BUS FORMS	23- 28	25 5/8	- 1/4	-0.9
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	147-175	168 5/8	-6 1/2	-3.7
N	COLLINS RADIO	1¼- 20	19	- 3/8	-1.9
N	CONTROL DATA CORP	43- 87	83	-4	-4.6
N	DATA GENERAL CORP	56- 99	86	-11	-11.3
O	DIGITAL COMP CONTROL	13- 25	15	+ 1/2	+4.0
O	DIGITAL EQUIPMENT	72- 97	87	+1 5/8	+2.0
N	ELECTRONIC ASSOC.	6- 13	11 7/8	- 7/8	-6.8
A	ELECTRONIC ENGINEER.	8- 14	10 1/4	- 3/8	-3.5
O	FOXBORO	34- 41	38 1/8	- 5/8	-1.6
O	GENERAL AUTOMATION	13- 26	23 1/4	+1 3/4	+8.1
N	HEWLETT-PACKARD CO	44- 60	59 1/4	- 5/8	-0.6
N	HONEYWELL INC	130-158	149	-4 1/2	-2.8
N	IBM	353-398	387 3/4	-6 1/2	-1.6
N	INTERDATA INC	8- 16	14 1/8	-1 1/8	-7.5
O	MICRONATA CORP	5- 10	9 1/2	+2 1/2	+35.7
N	NCR	29- 34	32	+ 1/8	+0.3
N	RAYTHEON CO	39¾- 47	45	+1 3/4	+3.7
N	SPERRY RAND	30- 39	35	+ 1/4	+0.7
A	SYSTEMS ENG. LABS	11- 16	14 5/8	- 1/8	-2.5
A	VARIAN ASSOCIATES	14- 18	16 1/4	- 1/2	-2.9
N	VICTOR COMPTOMETER	15- 24	22 1/2	- 7/8	-3.7
N	WANG LABS.	35- 58	54 1/8	-4 1/2	-7.8
N	XEROX CORP	121-161	155	-4 5/8	-3.2
	LEASING COMPANIES				
A	GOOTHE COMPUTER	9- 18	10	+ 1/2	+5.2
O	BRESNANAN COMP.	2- 3	2 1/2	0	0.0
O	COMDISCO INC	8- 14	14	+ 1/4	+1.8
O	COMPUTER EXCHANGE	2- 2	2 1/4	0	0.0
A	COMPUTER INVSTRS GRP	8- 14	13	+ 1/8	+0.9
A	DPF, INC	8- 13	8 1/2	-1 7/8	-18.0
M	DATRONIC RENTAL	3- 4	3 1/8	- 5/8	-16.7
A	DCA, INC	8- 10	7 5/8	0	0.0
A	DEARBORN-STORM	18- 26	22 7/8	+ 1/8	+0.5
O	GPA, INC.	5- 8	8 1/8	- 1/4	-3.9
A	GRANITE NGT	8- 11	8 3/4	- 1/4	-2.5
N	GREYHOUND COMPUTER	8- 11	8 3/4	- 3/4	-7.8
N	LEASCO CORP	20- 24	22 1/4	- 1/4	-1.1
O	LECTRO NGT INC	2- 4	3 5/8	- 1/8	-3.5
O	NCC INDUSTRIES	8- 11	8 5/8	- 1/8	-1.2
A	ROCKWOOD COMPUTER	4- 7	4 3/4	+ 1/8	+2.7
O	SYSTEMS CAPITAL	1¾- 14	13 3/4	+6 5/8	+50.6
N	U.S. LEASING	56- 68	66 1/4	- 7/8	-1.8

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index

Computer Systems ----- Software & EDP Services
Peripherals & Subsystems ..... Leasing Companies
Supplies & Accessories ------ CW Composite Index



Earnings Reports

SCANTLIN ELECTRONICS
Year Ended Dec. 31

	1971	1970
Revenue	$6,969,733	$8,546,173
Spec Cred	a3,314,714	.....
Earnings (Loss)	b1,372,710	(4,011,699)

a-Gain from licensing agreement with First National City Corp. b-Equal to 60 cents a share.

CLARY
Year Ended Dec. 31

	a1971	1970
Revenue	$10,010,000	$8,162,000
Earnings	b769,000	c1,454,000
Earnings (Loss)	c680,000	(2,133,000)

a-Preliminary. b-Credit. c-Equal to 47 cents a share. d-Debit; special charge for equity in the loss of a 49%-owned company.

SUPREME EQUIPMENT & SYSTEMS
Six Months Ended Jan. 28

	1972	1971
Shr Ernd (Loss)	$.38	$(.05)
Revenue	5,581,400	4,236,000
Earnings (Loss)	256,300	(33,000)

DATATAB
Year Endad Dec. 31

	1971	1970
Shr Ernd	$0.18	.....
Revenue	4,229,480	$3,929,054
Spec Item	c8,046	d262,480
Earnings (Loss)	a107,020	(301,027)

a-Based on income before special credit. c-Credit. d-Debit. e-Equal to 19 cents a share.

COMPUTER EQUIPMENT
Year Ended Jan. 1

	1972	1971
Revenue	$18,799,000	$17,008,000
Loss Dbc Op	219,000	1,106,000
aSpec Cred	325,000	295,000
Earnings (Loss)	c331,000	(454,000)

a-Primarily from repurchase of company's notes at a discount and from tax loss carryforward. c-Equal to 13 cents a share.

AMPEX
Three Months Ended Jan. 29

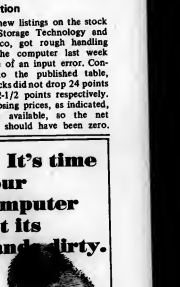
	1972	1971
Shr Ernd	$.12	$.12
Revenue	$54,300,000	$2,953,000
Earnings (Loss)	(82,901,000)	1,350,000
9 Mo Shr Erns	.20	.20
Revenue	209,600,000	221,913,000
Earnings (Loss)	(86,300,000)	2,730,000

KEANE ASSOCIATES
Year Ended Dec. 31

	1972	1970
Shr Erns	$.12	$.40
Revenue	2,419,034	2,741,879
Earnings	99,262	297,650

Correction

Two new listings on the stock table, Storage Technology and Comdisco, got rough handling from the computer last week because of an input error. Contrary to the published table, the stocks did not drop 24 points and 12-1/2 points respectively. The closing prices, as indicated, weren't available, so the net change should have been zero.



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